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THE BULLETIN OF
THE GEOGRAPHICAL SOCIETY
OF PHILADELPHIA

VOLUME 6

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THE BULLETIN

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VOL. VI, NO. 1 JANUARY, 1908

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1520 Chestnut Street, Philadelphia

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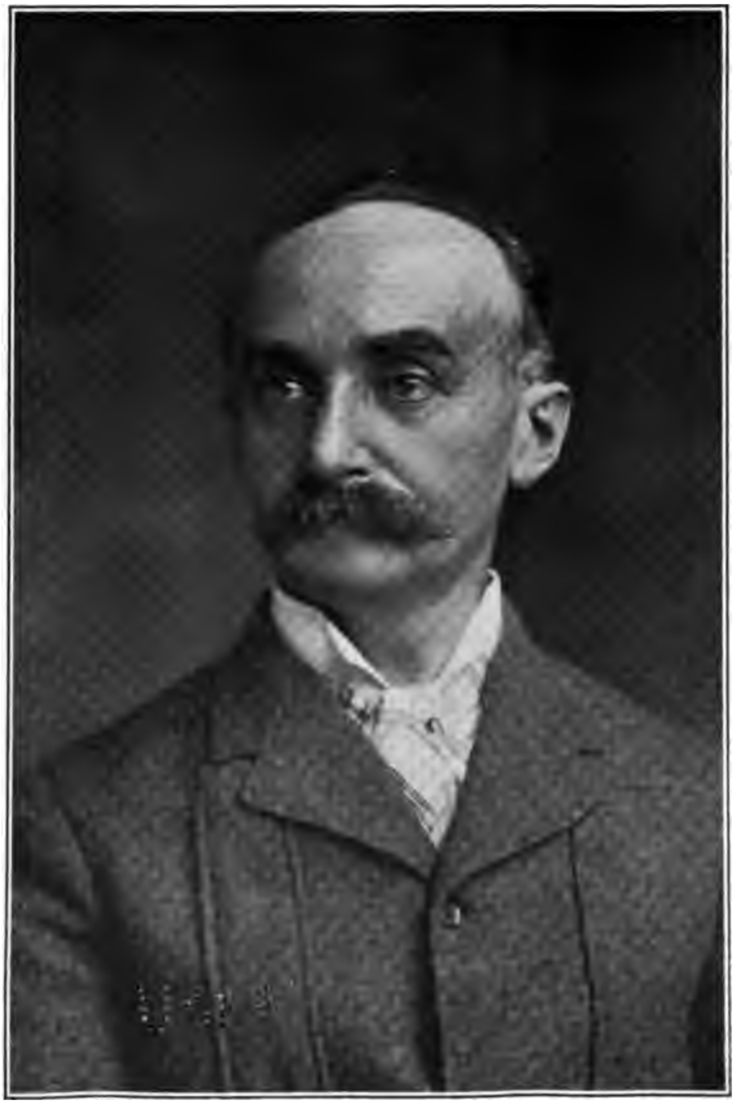
The Objects of the Society are to promote the science and study of geography, to assist in geographical exploration, to provide its members with a well-selected library of works on geography, to provide for lectures by prominent geographers, to enable the members to give each other the benefits derived by travel at home and abroad, and to publish a Bulletin containing carefully selected geographical literature.

The Meetings of the Society are monthly and inter-monthly. The monthly meetings held on the first Wednesday of each month from November to May, inclusive, are addressed by prominent geographers, and are intended to keep the members informed regarding the advance being made in the knowledge of the world and the science of geography. The inter-monthly meetings are smaller and less formal gatherings addressed usually by members of the Society, each program consisting of two or more twenty-minute talks. The reception following the address at the monthly meeting constitutes an enjoyable social feature of each meeting.

The members of the Society meet each spring for an annual subscription dinner. There are also occasional afternoon receptions held in the rooms of the Society, at which are shown special collections of photographs and other objects of geographic interest.

Excursions. In the spring and autumn a series of excursions is arranged by a committee appointed for that purpose. These afternoon walks



PROFESSOR HEILPRIN

PROFESSOR HEILPRIN

INTRODUCTORY ADDRESS.

PRESIDENT ALBA B. JOHNSON.

A new administration of the Geographical Society of Philadelphia presents its greetings to its members.

We have come home from our summer wanderings, some of us from various parts of our own country, some of us from abroad, and we are about to start upon the work of another year. These wanderings may have been for many purposes, for health and recreation, for pleasure, for research, for scientific knowledge of all kinds; and now we gather once more to make the most of another all too brief year.

In returning from abroad, each of us may have had the unpleasant experience of receiving sad news upon approaching the shores of his native land. Lately, in my own experience, I have approached the shores of America with high anticipations of the expected meeting with loved ones, only to receive information of a gap in the circle supposed to be unbroken. It is not an uncommon sight, as our transatlantic steamers come up the harbor of New York or Philadelphia, to see some one or some little group upon the far side of the ship, away from the crowds, with sad faces and with handkerchiefs pressed to the eyes. As I returned in July of this year, the first information that came to me was of the passing away of our beloved friend, Professor Heilprin. His funeral was about to take place as I came up the harbor of New York.

This Geographical Society of Philadelphia was founded about the year 1891, largely upon the initiative of Professor Heilprin. I was not one of its original members, nor was I so fortunate as to enjoy the acquaintance of Professor Heilprin during many years. My acquaintance with him began within the last four or five years, and in our busy lives it was not as intimate an acquaintance as I would have wished it to be. I owed his acquaintance to my membership in this Society. The first impression he made upon me was

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that of a clear-headed thoroughly-informed scientific man, I might say, a scientific machine, for he seemed to be devoid of the weakness, the smallness, or the frailties to which most of us are subject. I was impressed by his zeal for scientific knowledge, his fearlessness in accepting whatever he conceived to be the truth, and his indifference to every consideration of personal toil or fatigue, or danger in the scientific service which he loved. But as I came to know him better, I began to feel his warm human sympathy, to perceive his intense interest in people:—I began to understand that his interest in the geography of any country, was second to his interest in the people of that country; and that while a great student of science, he was, first of all, not only a student but a lover of man.

I do not feel that it is proper for me to speak at length of the life or achievements of our beloved friend, Professor Heilprin. That should be done by those who have known him intimately for a long time. Therefore, I shall relinquish the floor to those who will speak much more effectively of him than it is possible for me to do.

The first speaker will be one of our own members, and one of my predecessors as President of this Society,—Mr. Henry G. Bryant, who, having recently returned from an extended tour around the world, was absent at the time of Professor Heilprin's death. Mr. Bryant will treat especially of Professor Heilprin's connection with the Geographical Society of Philadelphia. I take great pleasure in presenting Mr. Bryant.

PROFESSOR HEILPRIN AS TRAVELER AND EXPLORER.

HENRY G. BRYANT.

In appearing before you this evening as one of the speakers at this memorial meeting, I realize that no contribution which I can make will add to the oratory or literary impressiveness of this occasion; and yet when our President requested me to speak I regarded it as my duty, as it is also my pleasure, to be present, and hence I am here to add my tribute to the memory of my departed friend.

To those who were honored by his friendship there was, perhaps, no characteristic that was more apparent than his versatility. His range of information on subjects connected with the natural sciences was truly extraordinary. A trained naturalist and geologist, he devoted himself, especially in later years, to many problems broadly associated with geography; and the results of these studies were given to the public in a series of publications which, in addition to their scientific value, possess a human interest which greatly enhances their popularity and usefulness. But I shall leave to others to speak of these aspects of his career, as well as his success as a teacher, and his recognized attainments in the fields of art and music.

As a traveler and explorer he gained fame which extended beyond the borders of his home city and state; and, after all is said and done, it will perhaps be this phase of his many-sided life that will serve best to perpetuate his memory. This is altogether fitting, for when men of scientific attainments are constrained to visit remote corners of the earth and—forsaking the comforts of civilization—devote themselves to the conquest of nature in her severer forms—it is not unreasonable that such sacrifices in the pursuit of knowledge should meet the approval of a discerning public opinion.

One need only consider the many expeditions with which his name is identified, to realize that in Professor Heilprin burned that traveler's fever of unrest which associates him with the illustrious company of explorers who have made the world their debtors by contributing to a better knowledge of this earth—our dwelling place. We are here to testify that according to his opportunities he did his share in this noble work.

As an associate of Professor Heilprin on the Peary Relief Expedition of 1892, I may be pardoned if I draw on some personal recollections to illustrate his methods while in the field. Whether contemplating a journey to the Far North or to the jungles of South America, he invaribly familiarized himself with the existing literature relating to the region to be visited. He selected his companions with judgment and imbued them with his own enthusiasm.

As a result of fair treatment and unvarying courtesy toward the members of the Arctic Expedition referred to, in spite of the many vicissitudes of the voyage, every member of the party returned home a warm friend of his leader. One unique feature of that journey was the series of informal talks which he gave during the voyage relating to the fauna and flora, and especially to the glacial phenomena, of the regions we were visiting. One other incident I recall which made a marked impression at the time: it was late in August, and with the members of the Peary party we had on board we had made our way in the steamship Kite, to the southwest coast of Greenland—homeward bound. The weather conditions being favorable, it was decided to put in at Godthaab, a Danish colony, which is the capital of the southern district of Greenland. Needless to say, we were heartily welcomed by the Danish officials and missionaries residing there. On the last day of our visit, as the long twilight of the Arctic summer faded into night—most of our company were assembled at the house of the assistant governor listening to some singing by the wife of that official. Our host presently invited Professor Heilprin to play on the new piano which had just arrived from Europe. Without a moment of hesitation he sat down and entertained us for an hour with selections from the works of Rubenstein and other composers, all executed with the power and expression of an artist. Never before or since, I venture to say, had those bleak shores heard such harmonies.

As a young man, soon after his return from Europe, where studies under Huxley and other masters had equipped him for his life work, Professor Heilprin in 1880 became identified with the Academy of Natural Sciences with which institution he was associated for some twenty years. As Professor of Geology at the Academy and later at the Wagner Free Institute of Science, he made an enviable record as a conscientious instructor; but early in his career he demonstrated a fondness for independent field work which led him to make many investigations in distant lands. The untiring energy of his nature thus impelled him to seize every opportunity which his academic or literary duties permitted to extend the scope of his researches. A brief recital of some of these journeys will, perhaps, give us a better idea of his activities than could be obtained in any other way. I shall content myself with merely reading the list, although it will be understood that in most cases books or scientific articles were published as a result of the journeys made:

1886—Exploration of the Florida Peninsula and Everglades.

1888—First visit to Mexico.

1889—Investigations of the Physical History and Zoölogy of the Bermuda Islands.

1892—The Peary Relief Expedition.

1896—Visit to Morocco, Algeria and Tunis.

1898—Alaska and the Klondike.

1902 and in subsequent years, investigated the volcanic phenomena of the Island of Martinique.

1906—Visit to British Guiana.

As the moving spirit in the inception of this organization Professor Heilprin is justly entitled to the designation of Founder of the Society. As the Secretary of the American Alpine Club, I wish to remind this audience that he was also the founder of that representative brotherhood of mountaineers. It was my good fortune to assist at the birth of both of these children of the brain of our lamented friend, and the success which has attended their later years is, in no small degree, owing to the strong marks of his own individuality impressed upon them.

In May, 1902, when the first news was received of the volcanic disturbances in the West Indies, Professor Heilprin realized the importance of a study of seismic forces in the field as offering possible solutions for the many problems connected with vulcanism. He took the first steamer for Martinique, and after his arrival on the scene, lost no opportunity to study the phenomena connected with the successive eruptions of Mt. Pelée. On May 20th he made his famous ascent of the slopes of the volcano while it was still in a violent state of activity. Reaching the edge of the summit crater, he remained in the vicinity for four hours in the midst of imminent peril from falling objects and deadly gases. When he returned he was covered with mud and ashes and greatly exhausted from the ordeal through which he had passed. On recovering his strength he again ascended the mountain, securing valuable data and a wonderful series of photographs. His calm demeanor in the presence of these appalling manifestations of the titanic forces of the earth, won the unqualified praise of other observers who were present in Martinique, and spread his fame as a fearless scientist throughout the world.

His last extended journey led him to examine the vast forests and jungles adjacent to the mouths of the Orinoco River in South America, and it is said he here contracted a form of tropical fever which hastened his death.

Professor Heilprin's achievements in the world of science were recognized in various way notwithstanding a certain lack of self-assertion on his part. From the time he received the Forbes Medal in London in 1877, honors of this kind were not lacking. At the time of his death he was the President of the Association of American Geographers. In addition to membership in various societies he was awarded the Longstreth Medal of the Franklin Institute and the Gold Medal of this Society; while the French Government made him an Officer of the Academy. But we can truly believe that the desire for extraneous distinctions of this kind had little to do in influencing his career. On the other hand, I prefer to think of him as fulfilling Commander Peary's definition of an explorer:

"The true explorer," he says, "does his work not from any hopes of reward or honor, but because the thing he has set himself to do is a part of his being and must be accomplished for the sake of its accomplishment, and he counts lightly hardships, risks, obstacles, if only they do not bar him from his goal."

PROFESSOR HEILPRIN'S SCIENTIFIC WORK.

DR. EDWARD J. NOLAN,

I regard it as an honor to be here as the representative of the Academy and to contribute to the proceedings an expression of its appreciation of Professor Heilprin's work and his service to science while connected with the society from 1879 until within a few weeks of his death. I had at first thought of confining myself to a few general eulogistic remarks, but I believe a succinct, but, I hope, reasonably complete record of Professor Heilprin's services to science while connected with the Academy would be the best eulogium that I could pronounce.

Before his connection with the Academy, Professor Heilprin had laid the foundation of a solid scientific training in the Royal College of Mines. The influence of Huxley and other eminent men, trained in the best educational methods, was of lasting value to him. After leaving London he studied in Paris, Geneva, Florence and Vienna, returning to America in June, 1879, after an absence of three years.

He found on inquiry that the Academy of Natural Sciences of Philadelphia afforded him opportunities for study and investigation superior to those he could secure elsewhere, and he was generous in his recognition, not only of the wealth of the library and collections, but also of the liberality of administration which placed the resources of the society freely at his disposal.

Without loss of time he took up the study of his chosen branch, Invertebrate Paleontology. His bearing was that of a modest, retiring and industrious student. He presented his first paper for publication in the *Proceedings*, October 21, 1879, under the title, "On Some New Eocene Fossils from the Clairborne Marine Formation of Alabama." He offered two others the same year, and the papers and reports of verbal communications published by him during his active connection with the Academy, from then until 1891, when his work began to take another shape, number forty-six in all, in addition to annual reports.

He was elected a Correspondent of the Academy January 27, 1880, he then being regarded as a resident of New York, but deciding to remove permanently to Philadelphia, he was transferred to the membership list. He served as a Jessup Fund student during the latter third of the year, resigning that position on his appointment by the Council, December 27th, to the Professorship of Invertebrate Paleontology. He occupied this position until 1895, when he was transferred to the Chair of Geology, which he resigned in 1899.

He was elected a Curator October 2, 1883, to fill a vacancy caused by the death of Charles F. Parker, and was at once appointed Curator-in-Charge by the Council. He served the Academy in this capacity until the end of 1892.

He at once began important changes in the arrangement of the Museum, and started the formation of a collection illustrating the natural history of Pennsylvania and New Jersey. He made a number of admirable suggestions which it was impossible at that time to carry out because of the slender financial resources of the Academy. He advocated opening the Museum on Sundays, urged the formation of a Museum Endowment Fund and the erection of a lecture room. He organized a popular course of lectures in addition to those delivered by the professors. He prepared a hand-book to the Museum and gave most effective assistance in securing appropriations from the legislature in 1889 and 1891. Referring in the report of the Curators for 1892 to the operations of the Trustees and the Building Fund, and the progress made in the erection of an addition to the Academy, Dr. Ruschenberger says, "for a large part of the means to enable the Trustees of the Building Fund to do this work, it seems proper to mention here, that the Academy is very much indebted to the ability and steadiness of purpose of Professor Heilprin, who several times visited Harrisburg and by his representation to members thereof, greatly contributed to satisfy the Legislature of Pennsylvania of the worthiness of the Academy to receive pecuniary assistance from the state. Possibly without the influence of his intervention, appropriations might not have been granted at that time.

With a view to bringing the Academy into closer relations with those interested in its progress, he inaugurated a series of evening receptions in 1890. They were at first successful, but were discontinued as not fulfilling the end for which they were designed.

Although requested by his fellow curators to retain the office of Curator-in-Charge he resigned it April 1, 1892. He, however, resumed his duties as Secretary of the Board on the return of the Peary Relief Expedition and devoted much of his time to the study and arrangement of the collections brought from Greenland.

During his official connection with the Academy, Professor Heilprin's contributions to science were not confined to the papers published in the *Proceedings,* the terms of his engagement being such as to afford him liberal time for other congenial work. A paper on the Tertiary geology of the eastern and southern United States, which originally appeared in the journal of the Academy was, with a number of reprints of papers from the *Proceedings* on related subjects, republished in 1884 as a quarto volume under the title "Contributions to the Tertiary Geology and Paleontology of the United States." A year later appeared his "Town Geology: The Lesson of the Philadelphia Rocks." This was a rearrangement of the author's field-lectures delivered in connection with his professorship.

He also prepared about this time, by invitation of the Smithsonian Institute, a check-list of the Cretaceous fossils of the United States. In dealing with dates and synonyms the long-standing dispute between Conrad and Lea regarding priority had unavoidably to be impartially considered. For personal reasons the work was not published in Washington, and, Professor Heilprin believing that it would not be consistent with good taste to offer it to the Academy, the paper, if in existence, is still in manuscript.

An expedition to Florida was made under the joint patronage of the Academy and the Wagner Free Institute of Science in 1886. This was the first of a number of explorations which resulted in the advancement of science, and illustrated Professor Heilprin's enterprise and zeal. The results of the work in Florida are placed on record in a volume entitled "Explorations on the West Coast of Florida and in the Okeechobee Wilderness," published the following year as the first volume of the "Transactions of the Wagner Institute."

The geological observations were made in conjunction with Mr. Joseph Willcox, and were pronounced by Dr. Leidy in his preface to the work to be "an important contribution to science." The most noteworthy feature of the work was the determination, from paleontological evidence, for the first time in the United States, of the existence of a marine Pliocene formation. Professor Heilprin described the characteristic fossils and called the formation the Floridian Stage of the Pliocene, a designation which will be permanently retained in the terminology of American geology.

"The Geographical and Geological Distribution of Animals" appeared in 1887, and "The Geological Evidences of Evolution" the following year, the latter being an expansion of a lecture delivered in the Academy. "Animal Life on the Sea-Shore" was published the same year.

Professor Heilprin's lectures were not confined to the classroom, but were frequently delivered in the field, features of geological interest at accessible points being explained to the pleasure and profit of his students. A portion of the class in attendance on the spring course of 1888 was taken by him to the Bermuda Islands, with the special purpose of studying the coral reefs and the mode of their formation. Upon the specimens secured, many of them new to the Academy, were based several important contributions to the *Proceedings,* as well as an independent volume entitled "The Bermuda Islands: A Contribution to the Physical History and Zoölogy of the Somers Archipelago." He advanced no original views on the formation of coral reefs, but gave an excellent résumé of what had been published on the subject, and advanced arguments in support of Darwin's subsidence theory, while acknowledging that the effect of solution as advocated by Murray and supported by Agassiz, constituted an important factor in the formation of atolls.

He conducted an expedition to Yucatan and Mexico in 1890. A month was spent in the Peninsula of Yucatan exploring the caves and ruins and making collections. During the subsequent visit to Mexico the peaks of Orizaba, Popocatepetl, Nevado de Toluca and Ixtaccihuatl were ascended and their altitudes determined, the results being published in the *Proceedings* of the Academy on the return of the expedition. Points of interest determined related to the geology of Yucatan and the existence of coral reefs in the western water of the Gulf of Mexico. He regarded Orizaba as the culminating point of the North American continent, but it is now known that at least two of the Alaskan mountains are higher.

The publication of his "Principles of Geology," 1890, forming the seventh volume of the Iconographic Encyclopedia is another evidence of his extraordinary industry and power of application.

He was appointed by the Council of the Academy the leader of the auxiliary party which accompanied the North Greenland Expedition sent out by the Academy under the command of Lieutenant Robert E. Peary in 1891. Short of leaving Lieutenant Peary and his associates comfortably camped on the south side of McCormick Bay preparatory to operations the following year, but little was accomplished. Some collections were made, but the results were disappointing and became later the cause of misunderstandings due to the absence of explicit directions to the explorers. The most important specimen secured was a mass of Ovifak ironstone weighing approximately 260 pounds.

The following year, by appointment of the Academy, he commanded the Peary Relief Expedition. His meeting with Peary on the ice cap is one of the most dramatic incidents in the history of Polar enterprise. The story of the expedition was published in 1893 in a volume entitled "The Arctic Problem."

In 1896 he was appointed by the council a delegate to the Mining and Geological Congress at Budapest, and at the close of the meeting he made a journey to the Atlas Mountains of Algeria and Morocco. He here established the fact of the entire absence of glacial phenomena in the region visited by him. A volume entitled "The Earth and Its Story" appeared the same year. The records of Professor Heilprin's visits to the Klondike region in 1898 and 1899, as well as his studies of the phenomena of Mount Pelée and the destruction of Saint Pierre in 1902, belong to another story. His official connection with the Academy had terminated with the close of 1892, but the results of his explorations were prepared for publication in the library where all his scientific work was done on his return from engagements in New Haven and elsewhere. He was engaged in reports of his South American studies in the early part of last summer, and although evidently seriously ill, he continued the work until compelled to go to New York for rest and treatment. The fatal result terminated the career of a devoted and enterprising student whose powers of initiative and capacity for leadership were unusual.

As an official of the Academy Professor Heilprin's personal bearing secured for him many friends. He was ever cordial, courteous and obliging. No matter how much engrossed in his own work he was always ready to be generously at the service of those desiring help or information. His enthusiasm and enterprise had a markedly stimulating effect on his students, and his work as Professor of Invertebrate Paleontology and Geology has been productive of lasting results.

The Academy of Natural Sciences considers it a reason for congratulation, and as one of its services in the cause of intellectual progress that it was able to afford to Professor Heilprin on his return to America facilities for the prosecution of much the greater part of the work which has given him a distinguished standing in the world of science.

ADDRESS.

PROFESSOR RUSSELL H. CHITTENDEN,
Sheffield Scientific School, Yale University.

Professor Heilprin's formal connection with the Sheffield Scientific School began in 1904 when he was appointed lecturer in physical geography. From that date one-third of each college year was spent at New Haven, and I came to know him with a degree of intimacy that served to reveal many of the sterling qualities of heart and mind, which all who knew him clearly recognized. With our students he was most popular, for they quickly learned that he had intimate knowledge of the subjects on which he lectured; a personal acquaintance with the natural phenomena he so clearly depicted, which served to stimulate attention and interest, and led many a man to a fuller appreciation of the importance and significance of a study of Nature. Indeed, who could listen to Angelo Heilprin and not be impressed by his great breadth of knowledge, and especially by his enthusiastic interest in the subject to which his life was primarily devoted. His enthusiasm was contagious, and many a man who, at the outset had little or no interest in the subject to be discussed would, on the completion of the course show in an unmistakable manner the effects of the enthusiastic teaching of the master.

Angelo Heilprin in his own work was a stranger to half-hearted effort; intermittent attention to duty was not one of his characteristics. He belonged rather to that small group of men who appreciate the importance of insistent and consistent effort. He realized that opportunities are to be improved to the utmost, that success can come only from earnest effort, in harmony with that saying in Ecclesiastes, "whatsoever thy hand findeth to do, do it with all thy might." When Peary, in his search for the North Pole in 1892, was practically buried in the ice and snow of the Arctic regions, lost to the civilized world, and in grave danger of utter destruction, Angelo Heilprin, by hard and insistent effort, battling at every turn with the furious elements of that inhospitable region, successfully led a relief expedition which brought succor to a group of weakened explorers who could not have endured much longer the privations to which they were exposed. Skill, knowledge, experience, all available means at the disposal of man, were by themselves alone as nothing compared with the indomitable will, strength of purpose, courageous effort and unflagging zeal of this leader of men, who, having found work to do, did it with all his might.

Again, what a forceful illustration of self-forgetfulness, of utter disregard of personal danger, of determined effort to reach the solution of one of Nature's mysteries is to be found in Heilprin's work at Martinique and his later study of Mont Pelée. In that terrible destruction of Martinique, with its loss of 30,000 lives and the wonderful throwing up of the power of Pelée, was to be found a striking illustration of volcanic power, perhaps not equaled since the destruction of Pompeii. Is it to be wondered at that the spirit of investigation was aroused to the utmost in this man's mind? Here was an opportunity rarely afforded to mankind. I doubt if the thought of danger, of possible death, of possible risk even, ever entered his mind. Here was something to be done; here a chance to broaden man's knowledge of volcanic phenomena; and he improved the opportunity to the utmost. I have often read the vivid description of his numerous ascents of Mont Pelée, even while the volcano was thundering forth its deluge of boulders and death-dealing vapors, but never without a thrill, and a feeling of admiration for the splendid courage and apparently unconscious spirit that permeated the man.

That there was danger to a man standing on the edge of this wonderful crater we can well imagine. Thirty thousand people had been destroyed by the rocks and emanations from this same crater a short time before; but the only comment made by Heilprin in his description of this particular ascent at a time when he was endeavoring to obtain a single glimpse of the avalanches of rock that were being tumbled about through the vapors and whose roar went out like the distant flow of thunder, was that "the volcano was in an unusual state of eruptivity, a not exactly comforting assurance to the folk who had come to know the burning mountain."

Such events in the life history of a man testify to his character and courage, and as we who knew Professor Heilprin look back over his eventful life, we find ample evidence of strength of purpose, courageous action, and scientific acumen; characters that helped to make the man what he was.

Angelo Heilprin has gone, but his memory will abide with us always.

Telegram from Commander Peary.

Dated "New York, November 6, 1907.

"Philadelphia Geographical Society,
"Witherspoon Hall, Philadelphia:

"Deeply regret to find at last moment Mrs. Peary and I unable to be present to-night as we had intended. News of the death of Professor Heilprin came to us with the shock and feeling of loss of a personal bereavement, from which we have not yet recovered. A man among thousands, Professor Heilprin's place can never be filled. Your Society and the Alpine Club of America, both children or his great brain, both distinctive in the scientific field of this country, will always endure as monuments of his great ability and far-sightedness. You and all your secretaries know that to him was due primarily the renewal of interest in Arctic work in this country which began sixteen years ago, and which has not yet reached its culmination. Strong, resourceful, deeply loyal, and superlatively able, he was the personification of Mark Antony's words, 'My friend, faithful and true to me,' with us as with all who had the honor and privilege of his acquaintance and friendship, his memory will always be green.

"PEARY."

TRIBUTE FROM THE AMERICAN GEOGRAPHICAL SOCIETY AND THE PEARY ARCTIC CLUB OF NEW YORK.

Herbert L. Bridgman.

I am more than half inclined to think that I shall best perform the share you have kindly asked me to take this evening by attempting the messenger's duty only, to bring you the tributes of others. The Brooklyn Institute of Arts and Sciences, of which Professor Heilprin was a corresponding member and a valued lecturer, at its first meeting after his death, adopted a Minute, paying to him honor as an ideal student and teacher, possessing in a rare degree the power to discover and disclose the secrets of nature and the truths of science. Also the following appreciation from Commander Peary, whose name is a synonym for all that is greatest and best in Arctic exploration, was read at Professor Heilprin's funeral:

"I cannot begin to express my feeling of personal loss in his death. The loss to the scientific world, to geographical circles everywhere, to the Geographical Society of Philadelphia and the Alpine Club of America, both of which were the inception and children of his brain, can never be made good. But the loss to those who have known him intimately for years is beyond words.

"My own obligations to and regard for him are particularly great. To him, more than to anyone else, is due the activity of this country in Arctic and Antarctic work during the past fifteen years; for it was his interest and belief in my first project for Arctic work, presented to the Philadelphia Academy of Natural Sciences in 1891, that led to the adoption of that plan by that organization, and the consequent awakening of interests in Polar matters in the years since then.

"I always found him ready, loyal and superlatively able. When I named one of the greatest of Greenland glaciers and later one of the most northerly lands after him, it was no perfunctory action, but a tribute of the deepest regard and friendship."

The American Geographical Society of New York, oldest organization of its kind in the country, also bids me express to the Philadelphia Society its own sense of loss of a co-worker, leader and an instructor whose words were always inspiring and whose example, both at home and in the field was one of intelligent zeal and continuous loyalty.

Others, whose judgments are weighty and whose verdicts are final, will speak to you of the work of Professor Heilprin in the many fields of science and research to which his life was devoted. My own association with him began through the ordinary contact of man and man, in the everyday affairs of mutual interest, but deepened and strengthened with the years into firm and staunch friendship. Engrossed in widely separated fields of labor, we came together on a common meeting ground, lightened by a sense of freedom from responsibility in an interchange of opinion and discussion which afforded, perhaps, a clearer view of the real individual, of the actual personality, than if we had had more formal or definite relations.

I can speak of Professor Heilprin as a friend, of a friend, though there was more than that mere superficial liking which passes sometimes for friendship. He made one conscious of keen and quick sympathy; of the sincere desire to encourage and develop in others no less than himself, something better and higher, thus making the pursuit of truth, the study of Nature, the investigation of its laws, but the means to an end. All of you who came into close personal contact with Professor Heilprin must realize what I mean much better than words can express, and in that fine individual assertion lay, I think, the chief source of his remarkable achievements. To him, Nature was a friend, a companion to become acquainted with, to know by faithful observations, by honest, open-minded, wide-visioned, study and comparison. To him, Nature was no sphinx nor tyrant, but rather a loving and leading power, to be cherished and interpreted and in whose laws were to be read those of the life and development of man. With this disposition, this essential appreciation, the inclusion of others became easy and genuine, and in this way, the friendship based upon kindred tastes and interests grew to be a comfort, a strength and an inspiration. It does not fall to any one of us, perhaps, to take up the work which death has interrupted. That will, in the nature of things, adjust itself. It is, however, an obligation, a privilege, to treasure the memory and the ideals of this man and friend, whose life spoke so clearly, so nobly, which rang always true, whose echoes we can never fail to hear.

ADDRESS.

PROFESSOR WILLIAM LIBBEY,

Princeton University, representing the American Philosophical Society.

I am glad to have the opportunity of representing probably the oldest societies of America on this occasion. I am sorry to say that the notice which I received being late, will necessitate my speaking not so much upon Professor Heilprin's work as upon his character.

There are many vulgar estimates of greatness. The mere sense of isolation by elevation above the plane of common humanity is often gratifying to small minds, but it is far from satisfying, and its emptiness is often as apparent as the comments passed upon it. One is reminded of the question asked of a person who had taken a trip in a balloon, as to "whether he did not suffer from the heat when he got so much nearer the sun"—forgetting that the further we get from touch with humanity, the colder it becomes.

I am afraid that many of us fill our lives with regret, at being confined to narrow fields of usefulness. We forget that the man with one talent is never held responsible for five. We have not learned the lesson of high endeavor and faithful plodding work. We have not lived up to that famous epitaph placed upon a Roman hero's tomb, which was considered his highest praise, "Fortiter, feliciter, fideliter," "bravely, cheerfully, faithfully," and know that these words covered a life of devotion, well rounded out and complete in all its details.

A commodore in our navy, when told by some one that the "Congress," a vessel commanded by his son, had struck her flag, simply said, "Then Joe is dead." Could any higher praise be given him?

How true this praise is of the lives of most teachers. To use Professor Heilprin's own words in an article in the *Forum* in 1900, "a teacher is said to be impractical, to be a dealer in facts which bring remuneration to neither body nor soul." However true this may be, the unheralded successes of a teacher's life are none the less real to himself, though we do not often stop to realize how much sacrifice they involve, and how much they mean to us. To the teacher in science this is especially true, because if he is true to his standards he gets closer to his students than other masters, as he has to study their capacities quite as much as his subjects.

I know of no field of scientific investigation so well fitted for exact training as that of geography, or one which involves so much preliminary work, not only in the study, but in the close investigation of nature.

It is in the intimate combination of these two spheres of activity that we find the secret of Professor Heilprin's success. He was an investigator by nature, and a teacher from choice. He believed that a little of real geography was worth a ton of theoretical geography. This was not to despise the theoretical side of the subject, far from it, but to galvanize it into life as only the enthusiastic field worker can do.

As with many other workers in this field, the mountains were his favorites; he worked along high levels in more senses than one. This actual contact with nature made him the greater power on the lecture platform and in the class room. His many publications have made a name and fame for themselves, but his personality and enthusiasm, were the telling points of his character.

Henry Ward Beecher once said that the greatest men in this world were the "shadow men," men who had lived and worked and gone beyond, but whose strong personalities cast a long shadow across our horizon.

To-night we stand before such a shadow, and it points the way to greater earnestness and faithfulness; to greater joy in work, and perhaps, greater sacrifice. No life has been in vain which produces such a result.

WITH PROFESSOR HEILPRIN IN THE ROCKY MOUNTAINS.

FRANK B. GREENE.

It was my good fortune to be a member of the party that in the summer of 1895 visited the heart of the Rocky Mountains under the leadership of Professor Angelo Heilprin. The company of ten was recruited mainly from his class in geology, and as all but one are or have been members of the Geographical Society of Philadelphia the trip was practically an excursion of that organization. Everyone in the party was familiar with the efficiency of the leader. The lack of friction and the precision with which all details of the schedule were carried out more than justified the most sanguine expectations.

Our mode of existence was far from monotonous. The accommodations of the hotel and of the Pullman sleeper were often exchanged for something more nearly approaching the simple life. Our base of operations was a camp at Green Mountain Falls in the Ute Pass, Colorado. Short excursions were made from this point while we were becoming accustomed to the more or less strenuous exertions in comparatively high altitudes. Quite a number of interesting localities thus reached were not included in the route of the ordinary tourist. As we usually returned to camp by evening and were never absent more than two consecutive days a considerable part of the outing found us reposing in our tents at night time. Upon one accasion an ample hay loft in a commodious barn on the ranch of an hospitable acquaintance formed a welcome couch. At the timber line of Pikes Peak and again in the canyon of the Arkansas near the Royal Gorge the wanderers accepted such comfort as mother earth could afford in the way of a pillow, with the starry heavens as a roof. Our daily pilgrimages usually included tramps of some kind, often in the form of the ascent of some of the lesser mountains in the Pikes Peak region. Frequently the trips were entirely afoot. Wagons or barges carried us when our destination was at some distance from our base, or when the railroad was not available.

Among the places visited during the first part of our trip was Florissant Valley, with its petrified forest, opalized wood and fossil lake. Nearby stood a volcanic neck, the surviving remnant of the mountain, which had caused the extinction of the lake by a shower of ashes. The resulting soft rock, when peeled off in thin layers, bore the impressions of myriads of insects carried down by the volcanic dust. Cripple Creek, then a primitive mining camp, was an interesting spectacle. Our party was the first group of outsiders accorded the privilege of visiting Stratton's famous Independence mine.

During the two or three weeks thus spent within easy reach of the camp, the skilful guidance of Professor Heilprin was always felt though never obtrusively exercised. He not only sought to provide for the comfort and enjoyment of the party and for their instruction in the study of geological and geographical phenomena, but was himself quietly observing the behavior of his fellow travelers and their adaptability to new conditions and surroundings. On the whole, I believe, his investigations were satisfactory. There was ready response to his suggestions and every indication of perfect allegiance. His only disappointment was the discovery that there was too great a regard for the conventionalities of civilization and too little fondness for the arduous exhilaration of "roughing it." With a patient sigh he yielded to the inevitable and reluctantly abandoned some of the more pretentious efforts which he had planned.

After the return from Cripple Creek our camp was deserted and we started on a longer journey, mainly by rail. A heavy rainfall on the first night gave us much to be thankful for, as we were not only relieved from the usual tortures of heat and alkali dust, but were enabled to enjoy the blessings of a marvelously clear atmosphere and the view of far distant ranges of mountains. Passing through the bad lands and coal regions of Wyoming we crossed the Green River and spent a short time in the land of the Mormons. A dip in the brine of Salt Lake, and an examination of some of the ancient beaches of Lake Lahontan, supplemented our inspection of the capital city. Traveling by daylight across the broad expanse of plateau, with its remarkable terraces and tilted ranges, there was no cessation of awe-inspiring scenery. With the Red

Cañon and the Book Mountain Plateau left behind us, a stop was made at Grand Junction. Through a maze of wild and rugged mountains and gorgeously colored canyons we visited Ouray and the mining camps along the route to Silverton and Durango. There we had a picture of Western life with miners, cowboys and Indians in abundance, and with smelters and gambling halls at that time in full blast. A little run into New Mexico and a turn to the north brought us to Salida. From this point a walking trip was made through the gorge of the Arkansas and the oil region around Florence. Returning by way of Pueblo and Colorado Springs a final visit was paid to the camp.

The magnificent natural scenery of this whole region, of which even the matter-of-fact and technical descriptions in the reports of the United States Geological Survey read with the fascination of a fairy tale, could not fail to arouse the enthusiasm of the most unimpressionable tourist. Into the enjoyment of the picturesque features of this great panorama of Nature, daily unfolded with unexpected and startling variety, Professor Heilprin entered with as much zest as any member of the party. When, by means of his explanations, there was added to superficial observation an appreciation of the relationship of one part of the picture to another, and of the geological significance of the formation and structure, the dullest of his hearers felt the range of vision enlarged till each aspect of the changing scene awakened a new and deeper interest. As a guide and instructor Professor Heilprin was seldom formal in manner and never pedantic. The members of the party were treated as comrades, courteously placed upon a footing of equality. When the pages of Nature's open book were being translated, it was with the assumption that the power of interpretation was a common gift and that he was acting merely as spokesman. There was no talking down to inferiors. The language was simple and generally devoid of scientific phraseology. Often his own surprise upon encountering remarkable or unlooked-for phenomena was as genuine as that displayed by his companions. One of the salient features of the Rocky Mountain scenery is its vastness, its grandeur, the immensity of the scale upon which all things have been shaped and arranged. In such an environment distance and dimension assume new meanings. It was one of our daily pastimes to record the individual estimates of the heights of buttes and mesas, the depth of canyon and the remoteness of mountains or ranges. We were indulging in a game in which past experience served rather as a handicap than as an advantage. At first all shot wide of the mark, and no one was more amused than Professor Heilprin himself. Throughout the entire trip it was his custom to call different members of the party for accounts of the events and adventures of the day, or at times for descriptions of localities visited at some earlier stage of our wanderings. While busy in our preparations for departure, during our last days at camp, dismay and some grumbling was caused by the receipt of instructions from headquarters for the drawing of a geological map of the region traversed. The results were more encouraging than might have been expected, and though hardly examples of perfect cartography they furnished proof of intelligent observation.

As we separated upon our return to Philadelphia it was with the belief and expectation that the future would afford opportunities for other excursions similar to that just ended. But, with the exception of a coaching trip conducted by him a few years after our tour in the Rocky Mountains, that was the last outing in connection with which he acted directly as leader of a party of any considerable size. For himself the nomadic instinct never lost its control, but thenceforth his researches were conducted for the most part alone or with one or two companions. Once again, on the occasion of his first voyage to Martinique, the chance came to me to accompany him, but circumstances made it necessary for me to decline his invitation. To be obliged to eliminate that summer season in the Rockies from the memories of the past would be a distinct loss. He who could spend much time in companionship with Professor Heilprin and find life dull or uninteresting must have been irresponsive and stolid. His manner was genial, his conversation brilliant, his fund of information extraordinary. His learning was not confined to the realm of science. Music, art, history and literature were fields in which he was no stranger. There was often the sparkle of wit in his remarks, and he had a ready appreciation of humor, but when it seemed out of place it was as distasteful to him as a discord to the sensitive ear of the musician. In discussion or argument he was tenacious of his opinions, occasionally to the extent of maintaining a position which seemed scarcely warranted. But in the main he was ready upon the strength of credible evidence to abandon even a fondly cherished theory. His attitude was like that of science to which he devoted his life. Though at times apparently dogmatic, yet in reality he was the foe of dogmatism and always the seeker after truth at whatever cost.

PROFESSOR HEILPRIN: THE MAN.

DR. THEODORE LE BOUTILLIER.

It is hard to get up to-night and say anything about a man whom every one of us heartily loved and whom every one of us felt had given part of his life to help in our education,—that in one way or another we, through him, had been brought to know something of Nature; that we should not live only on the surface, but that we should go deeply and get into a closer touch with the Nature that he so loved, and the Nature that he could so very thoroughly expound.

The loss that we have sustained in the Society seems irreparable, but as it has been said, those who will, in a certain measure, take his place, are trying to follow his footsteps; they will, in time, help to broaden the scope of the Society and follow out his life work in the work of the Society.

As this tribute to Angelo Heilprin is of a personal nature, he will be refreed to as "Mr. Heilprin," which term he much preferred from his personal friends, owing to the fact, as he laughingly told us, that "Professor" was used by all, from the "tonsorial artist" to the grave and dignified college teacher.

Over the scientific world he is known, as other speakers have told you, for what he has actually accomplished in such work, but comparatively few know of his marvelous versatility in other directions.

From the first his environment gave him a broad outlook upon life. His parents escaping from persecution in Poland in 1842, settled in Hungary, where Angelo was born, March 31, 1853.

Michael Heilprin, the father, became a zealous Hungarian patriot, and for persistent adherence to revolutionary views, and an active part in the revolution of 1848-49 was forced to flee. Going to Paris they returned to Hungary after some months, where they remained for several years. In 1856 they came to America, settling in Philadelphia.

From his earliest childhood he was taught the value of the study of the natural sciences, and his first lessons along this line were derived from Hooker's Child's Book of Nature, over which he pored with interest and a great degree of comprehension. The pictures in this book served also as his first incentive for depicting nature with pencil and brush. His interest in geography was precocious, and at the age of six years he drew a map of Greenland, on it designating the places known at that time. This map came to light during the summer of 1892 while Mr. Heilprin was the leader of the Peary Relief Expedition, when an uncle sent it to the family. Upon his return it was shown him as the work of a six-year-old child. He said that this was almost impossible to believe as it was correct in outline and detail. He was then shown the reverse side upon which was written his name and the date, April, 1859.

This talent for drawing and painting developed rapidly with practically no instruction, and, I am told by his brother, that when eleven years old, while residing in Washington, he obtained permission to copy the paintings in the rotunda of the Capitol, and there he spent hours at a time with pencil and paper. Before he was thirty he had exhibited paintings in the exhibitions of Philadelphia, New York and Boston, while we see to-night the result of his years of constant effort, in the paintings of the great eruption of Mont Pelée.

During Mr. Heilprin's childhood, as during the rest of his life, he had a remarkably high standard in reading, not spending his time on stories or light literature, but reading all the books of travel and exploration that he could obtain, including Livingston's and Bahn's works. These stimulated his interest in travel and exploration. This early zeal inspired his trips into the then unexplored wilderness of Maine and the Adirondack woods.

All his spare time from the age of twelve to sixteen years was devoted to the study of science, taking up one after the other—geography, geology, study of animal and plant life, paleontology, comparative anatomy and embryology, so that at the time most boys are entering college he was a thoroughly informed naturalist. This is the more extraordinary because this comprehensive work was done with no outside assistance, other than that of the intelligent guidance of a wise and scientific father.

During four or five years of this time he was engaged in the hardware business, not being able to devote his time wholly to study and travel. At nineteen he became assistant to his father, who was associate editor of the American Encyclopedia and with whom he worked four years.

In 1876, when in his twenty-fourth year, he went to Europe, where he spent three years in travel and study under the most eminent masters of geology and the natural sciences. From his return to America in 1879 his work is known to all and its various phases have been described by the other speakers.

This biographic summary gives but an inadequate idea of how completely this great mind was equipped for its broad life work, for perhaps beyond and above his insatiable thirst for, and pleasure in, knowledge and exploration, was his intense desire to open up to others the marvels and beauties of nature. To myself (to be personal) he was a first great formative influence, and I know of many others whom his enthusiasm stimulated toward an interest in what is best in life. Nothing was too abstruse for him to simplify to one really anxious to learn; nothing too simple for him to observe and perhaps point its relation to something more evidently important. Those who have come into close contact with him in his classes or upon trips will realize the force of this statement.

In 1896 it was my good fortune to have been his only companion upon his trip to Morocco, Algeria and Tunis, where he definitely determined that the Atlas mountains are a continuation of the Alps and geologically co-existent. This close association for two months was a wonderful revelation of a strong personality and a noble character. Whatever difficulties or disappointments arose he maintained a calm and good nature, and, with his usual resourcefulness was always ready to substitute some equally satisfactory plan. It was astonishing to find that his information and judgment extended to such things as rugs, pottery, even embroideries and so forth.

He had a comforting way of displaying to an average individual, like myself, a quite human weakness for some of the ordinary enjoyments of life. I have a vivid recollection of our feast of ice cream at Marseilles. Immediately upon our arrival from Africa we hastened to the first confectioner, where to the astonished enjoyment of the proprietor and a crowd of on-lookers we quickly vanquished three portions each.

Socially, was again displayed Mr. Heilprin's adaptability to all conditions, and all types of people. One need not have been profound or talented to claim his attention and courtesy, or enjoy his conversation which was frequently bright and sparkling. His wit was never caustic, but often had a droll facetiousness highly amusing, whatever the mental status of his hearers. That reminds me of a trip which some of the members here present took with Professor Heilprin in 1893. We were on a canal boat for several days and the owner of the canal boat, a man by the name of Countryman, gave this statement of Mr. Heilprin, which I think shows clearly and exactly what persons who were brought into contact with him—those of a lowly station in life—thought of a man of his wonderful character. He said: "That chap you call the professor is a good man—I didn't know such men lived as he is." I think that is one of the most touching tributes I know of. This man, who had no opportunity, and who spent his life as a captain of a canal boat, realized the strength and force of character of the man he was with. It was something that shows us the personality and how he impressed everyone who came into close touch with him.

We who know him intimately never heard him make an unkind remark or in any way belittle the efforts of anyone who was conscientiously striving to obtain or dispense knowledge. On the other hand he was fearless in contradicting or combating any statement which he believed to be inexact or misleading.

Mr. Heilprin's talent for music, as well as that for drawing and painting, was an almost spontaneous expression, for except a few lessons in childhood, he had little instruction in either.

Only those who cherished his personal friendship, before whom he sat in quiet self-forgetful abandon, playing on the piano some soul-stirring Hungarian national air, some fantastic Hungarian dance, or perhaps some wierdly melancholy strains of Hungarian folk-songs; only those understood how this wonderful soul was in touch with the enchanting world of melody.

Whatever it was: song, dance, rhapsody, or patriotic hymn, it was vitally Hungarian, and showed how into his innermost fiber was woven the idea of Hungarian liberty.

CLOSING WORD.

PRESIDENT JOHNSON.

With this the exercises of the evening are closed.

The keynote of Professor Heilprin's life was the doing of things that were worth while; whatever he undertook to do was worth while, and he did it in a way that was worth while. I think that we might apply to his life, words which were written in an entirely different sense in sacred literature, but which, I think you will agree with me, admirably fit his remarkable character. "He envied not, he vaunted not himself, was not puffed up; sought not his own, was not easily provoked; thought no evil; rejoiced not in iniquity, but rejoiced in the truth; bore all things, hoped all things and endured all things."

Geographical Society of Philadelphia

The objects of this Society have been to promote the science and study of geography, to assist in geographical exploration, to enable the members to give one another the benefits derived from travel at home and abroad, and to publish a Bulletin containing carefully selected geographical literature. In order to extend its activity along these lines and to lend more aid to the promotion of the science and study of geography, the Society offers a prize of fifty dollars for the best short contribution to geographical knowledge. The award will be made by the Publication Committee, from whom detailed conditions of the contest can be secured by addressing inquiries to

PUBLICATION COMMITTEE,
Geographical Society of Philadelphia,
400 Witherspoon Building,
Philadelphia, Penna.

A TRAVELLER'S NOTES ON JAVA.

HENRY G. BRYANT.

The island of Java in the Dutch East Indies, by reason of the rich beauty of its tropical scenery, its picturesque native races, its varied history and world famous archæological remains deserves attention from the intelligent traveller as a region worthy of special investigation. The writer, recalling how vague his own ideas were concerning Java before his visit to the island, and believing that few have had occasion to acquire special information relating to it, submits these random notes of a journey made in the spring of the year 1907.

At the risk of trying the reader's patience somewhat, a few general facts relating to Java are submitted by way of introduction to the general narrative of the journey.

This favored isle lies wholly within nine degrees of the equator and equals in area the state of New York. Its surface is diversified by many lofty mountains and it is remarkable for the great number of volcanic peaks which rise from the lowlands of the interior. No less than forty-five volcanoes are found on the island and these range from 2000 to over 11,000 feet in height and many of them are constantly in a state of semi-activity. Within historic times several districts have been devastated by these explosive forces while many will recall the eruption of Krakatoa in the Strait of Sunda in 1884 as one of the most desolating disasters of modern times. One result of this ceaseless activity of the forces of vulcanism during past ages has had the effect of covering the greater portion of the island with a thick layer of volcanic material which has produced a soil unequalled in the world for fertility.

This deep, rich soil supports a vegetation which in luxuriance and variety is unsurpassed by that of any other region of similar area, and ever since the Dutch established their first settlement on the island in 1595 a golden harvest of agricultural products has been yearly garnered to swell the granaries of the colonists and the revenues of the home government.

To the visiting American perhaps one of the most noticeable features about Java is the distinctly paternal character of the Dutch colonial administration. This was impressed on us on our first landing at Batavia where we had to report directly to the Chief of Police to obtain permits to travel on the island. Before these were granted full answers had to be given as to our names, nationality, occupation, age, and purpose in visiting Java. During our subsequent wanderings, we were obliged to hold these permits in readiness for inspection by officials and at all times we felt that our movements were a matter of some interest to the authorities. We are not surprised therefore to learn that the uniform policy of the government has been to discourage foreign travel in Netherlands-India and the present regulations are only a concession to the modern spirit which demands free intercourse among the nations.

To one who hails from a country where private initiative counts for so much, it is something of a shock to learn that nearly all the land is owned by the government. In securing from the native princes by treaty and purchase the lordship of the land, the Dutch Government also inherited the right to receive one fifth of the produce and the labor of the peasant. This led to the introduction in the year 1832 of what is known as the "culture system." This was a device to increase the revenues and consisted in the exaction of forced labor from the peasants, who were compelled, under official supervision, to cultivate tobacco, coffee, sugar, tea and indigo for their masters. This system of forced labor has been greatly modified in recent years and I was informed that it now survives only in connection with the government coffee plantations. To most of us, doubtless, the one agricultural product of Java which is best known is coffee. It was something in the way of a disillusion to learn therefore that the famous "Government Java" of bygone days is of much less importance as a product of the colony than formerly. A destructive "blight" visited many of the plantations some years since. Some districts have not yet recovered from this, and in the meantime, the coffee planters of Brazil have captured the bulk of the world's coffee trade.[1]

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[1] "According to a recent telegram to the Hague Government from the Governor General of Netherlands-India, the Government's Java coffee crop for this year is esti-

While the richest of the Dutch East Indies, Java is also the most densely populated—the number of inhabitants amounts to as many as nine hundred per square mile in some districts. Aside from the sprinkling of Europeans and Chinese the native population numbers twenty-nine millions. These all belong to the Malay race and almost without exception profess the religion of Islam.

The early culture of Java can be traced to India and there is no doubt that this Hindoo influence had the greatest effect on the religion, language and literature of the island. At the present time this influence is evidenced not only in the language and arts of the country, but by the great temples erected to Buddha. One of these, known as "Great Buddha" or "Boro Boedoer," is by many considered to be the greatest monument of Buddhistic architecture in existence. The Arab Mohammedan invasion occurred in the latter part of the fifteenth century and when the Dutch began to extend their settlements in the early decades of the seventeenth century, they found the faith of Islam extended to most parts of the island.

For the purposes of government, the island is divided into twenty-two residencies under the control of a Governor General who lives in Buitenzorg. Each province has its Resident who is assisted by various subordinates. In their dealings with the natives, the Dutch find it expedient to collect the taxes and administer the government through an army of native officials. Thus native princes fill the office of Regent in many of the provinces and "play" at ruling, but all real power rests with the foreign rulers who are called "elder brothers."

Lying so close to the equator the climate is a trying one to Europeans, although the style of dress in use and the manner of life do much to mitigate it. The rainy season lasts from October to April and at all times showers may be expected. Residents urged upon us the importance of avoiding the direct rays of the sun during the heat of the day. One soon learns that Java is a country of early rising. The ordinary business man has finished his coffee and is at his shop or office by six a. m. Between nine and four o'clock all

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mated at 39,000 piculs (picul = 1.35 pounds). In the colonial budget this crop was estimated by the minister at 125,100 piculs, but at the end of January last the minister was advised that the estimate had to be revised and to be reduced by 86,000 piculs. The reports from private estates are also very disappointing, and the exports of Java coffee generally promise to be very small this year." Daily Consular and Trade Reports, Washington, D. C., May 20, 1907.

Europeans endeavor to keep in doors. The midday meal is taken between one and two and fashionable society does not bestir itself until after five o'clock, when driving and visiting is in order until eight or nine o'clock when dinner is served.

Let me ask you to accompany me, as saying farewell to Singapore, the capital of the Straits Settlements, on January 29, 1907, I went on board the S. S. *LaSayne* of the Messagerie Maritime Compagnie, bound for Batavia, the capital city of Java.

Our sail of less than forty-eight hours over a tropical sea, was full of interest and mystery. Many of the passengers were expecting to cross the equator for the first time on this voyage, and the captain promised to blow the whistle at the moment our vessel was supposed to cross the imaginary line. After dinner that first evening at sea, we hurried on deck to witness a sunset of rare beauty. As the clouds lifted, we beheld the great orb drop into the sea in a blaze of color whose tints changed even as we gazed on them. We had learned that a partial eclipse of the moon was to occur during the evening, and to escape the heat below, as well as to see this phenomenon all hands remained on deck. Presently the mysterious shadow darkened the face of "the bright Regent of the sky" and later on (at 8:15) just as the shadow reached its greatest extent the ship's whistle sounded on the still air. A strange mingling of sensations truly, when we gazed on one of nature's marvellous spectacles and at the same time realized that we were entering a new hemisphere wherein the bright constellation of the Southern Cross beckoned us on to explore new lands and strange peoples.

All next day we sailed southwest with the great island of Sumatra in plain view to the westward and late in the afternoon entered Banka Strait, keeping on our port quarter, Banka Island so famous for its tin mines.

Early next morning, we docked at Tandjong Priok, the port of Batavia. A swarm of native runners and porters boarded the steamer, directly the gang plank was in place, and such a jabbering and shouting I have not heard since the old days at Atlantic City before silence was enjoined on the hack drivers.

Our present purpose in visiting Batavia was merely to secure permits to travel, and presently to trans-ship in another steamer to the eastern end of the island. After a short ride in the railway, we arrived at Batavia where we drove at once to the police headquarters for the permits.

The preliminaries attending the securing of permits to travel proceeded with true Dutch deliberation. After answering all the categories of the official, it transpired that the printed forms used for such purposes were all exhausted—hence it became necessary for the clerk to write out by hand the entire document. In due time, the necessary credential was obtained and we then undertook a drive about the city. The ancient city of Batavia proper is a grim, time-worn place with many warehouses and government buildings grouped amid the intersecting canals. It is said to be unhealthy and is wholly given over to commercial interests. Delaying here only for a brief survey, we continued our drive on clean, well-kept roads for two miles along canals suggesting Holland to the modern residential suburb of Weltevreden.

Passing under a white arch we paused a moment to examine the two statues of fierce-looking native gods which guarded the portal, observing also a guard of Javanese soldiers who are being drilled by a native officer. Continuing our drive, we soon arrive at a broad avenue facing the Konigsplein, a great, green parade ground with its bordering streets shaded by rows of tamarind trees. Facing this extensive park are numerous neat villas built in the bungalow style, often embowered in cool foliage, the homes of active and retired officials, army officers, planters and business and professional men who go to make up the white population of the capital. We soon come to an imposing building of classical design which proves to be the Museum of the Batavian Society of Arts and Sciences. The copper elephant on a pedestal in front of the building was a gift from the King of Siam, presented on the occasion of his visit some years ago. This museum contains the finest ethnological collection of any institution in the far East and its publications rank well among the learned societies of Europe and America.

But the rising sun warns us of the approach of noon and we turn down a side street and soon reach the welcome coolness of the Hotel der Nederlanden. As a rule, the hotels were found to be clean, well-kept and admirably designed to meet the requirements of a tropical climate. They usually consist of a main building openly constructed so as to admit the passing breeze. The charges in Java are much cheaper than in other parts of the East.

Here I made acquaintance with that famous gastronomic institution of Java known as the Rijst-tafel or rice-table. Seated in a spacious pavilion an army of beturbaned Malays brought us soup. Then large, deep plates were placed before us in which a supply of rice was deposited. On top of this basic stratum two inches deep we were expected to place an extraordinary variety of vegetables, curries, dried fish, eggs, fowls, and meats flavored with a variety of peppery condiments. After depositing on my plate eight of the dishes offered, limitations of appetite and space demanded a halt and the remaining half of the sixteen varieties were allowed to pass untouched. Subsequent experience with this rice-table—so fearfully and wonderfully made—taught me discretion; but I shall never forget the bewildering dismay of that first encounter. In this connection, a recent writer remarks that "it is humanly impossible to partake of the rice-table and not to grossly overeat oneself." Perhaps in this daily over-indulgence of the pleasures of the table, we may find the explanation of the fact that the great majority of resident Hollanders are inclined to corpulence.

In the cool of the afternoon we returned to Tandjong Priok and boarded a vessel of the Royal Packet Company's fleet which sailed the same evening for Soerabaya. A sail of thirty-six hours brought us to this city, the most important seaport in Java, with a good harbor at the mouth of the Solo River. Embarking in one of the native boats, we made our way amid the crowded shipping to the landing stage and passed the customs without delay.

Although commercially of great importance Soerabaya is hot and presents few attractions to the visitor. We observed an air of bustling activity in the streets which seemed to verify the city's reputation for alertness and ascendency in the mechanical arts.

Turning our backs on Soerabaya, a two hours' ride on the railway, through a densely tropical region, brought us to Pasourouan where we entered the curious carts of the country, called *dos-à-dos,* bound for the delightful mountain resort of Tosari. Ever ascending we advanced past miles of rice and sugar fields to a pretty little hotel on the lower slopes of the mountain range where we lunched. The remainder of the climb to Tosari was too steep for vehicles so horses and palanquins were used for the final stage of the journey. The entire excursion was full of interest, taking us through different climatic zones, each exhibiting their characteristic growths in wild profusion. While two of us were advancing ahead of the main party we surprised a large black ape which was walking in the road. He viewed us with interest for a moment and then disappeared into the forest.

With a feeling of intense satisfaction, we arrived at this delightful sanitarium, where a sojourn of several days in the salubrious air of the mountains gave us renewed strength for our travels in the lowlands.

A walk along the single street of the village gave us some idea of the mode of life of these mountaineers who are quite distinct from their neighbors of the lower valleys. Here are found the homes of the Tenggerese, that hardy tribe, who, at the time of the Moslem invasion, retreated to these mountain strongholds and successfully defended their homes against the invaders.

The lofty location of Tosari, perched on a flank of the Tengger massif at an elevation of 5480 feet above sea level, invites one, by its invigorating air, to undertake walking trips and mountaineering excursions, which in other parts of the island would be out of the question.

Two of these jaunts which abide in memory as among the choicest of Javanese experiences were the trips to the crater of the active Bromo volcano and another early morning climb to the summit of Penandjaän, a loftier eminence which commands an extensive view of the eastern part of the island.

With pleasant memories of our mountain sojourn, we discard our heavier clothing and descend to the plains, and delaying only one night in Soerabaya, we take the government railway and in five hours arrive at Soerakarta or Solo. This is the seat of one of the two great native princes called the Soesoehoenan who receives a handsome annuity from the government and is allowed to pose as ruler over four or five hundred thousand people. Here we are in the heart of old Java where it is possible to see the native life of the people as it existed centuries ago. Owing to the good offices of the Resident, we were allowed to inspect the Kraton, the great wall-encircled compound of the reigning prince. Accompanied by a Dutch official, the morning after our arrival we drove to the palace. This is built in the center of an area surrounded by walls four miles in extent. An army of over ten thousand servants and pensioners live within the Kraton. At the entrance to the inner palace we were met by the brother of the Sultan, an agreeable gentleman dressed in a jacket of European cut, but wearing the universal sarong about his lower limbs. The sash which held this in place contained a jeweled kris or dagger, the weapon which is worn by all persons of any position in Java.

Under his guidance, we visited the royal stables and carriage house, the spacious audience hall and zoölogical garden and partook of lunch in the upper room of the clock tower which commanded a fine view of the enclosure. Here a great variety of food and drink was offered to us by numerous native servants, all presented to us in the servile, squatting attitude assumed in the presence of royalty. Descending, we resumed the rounds of the palace, and everywhere encountered an army of officials and servants. Presently a middle-aged woman, dressed in the careless garb of the country, separated herself from a group of retainers and walking up to the prince shook his hand with great assurance of manner. We were informed by our European friends that she was the chief woman official of the palace, for the time being in undress costume. With her frouzy, gray hair, and a great ball of tobacco protruding from her lips, this Javanese mistress of the robes made anything but a courtly appearance.

Thanking our kindly host, we returned to our hotel and later in the day went shopping in the busy streets of the town. From a Chinese merchant we secured a number of krises or small swords said to be of ancient date but with wooden handles which had a suspiciously modern appearance. Here as elsewhere a number of women peddlers brought to the hotel samples of the artistic cloths from which the sarongs or skirts of the Javanese are made.

The universal style of dress consists of the sarong and kabaya. "The kabaya is a sort of dressing jacket often embroidered. Under it is worn the sarong, a brightly colored skirt falling down straight and narrow with one simple deep fold in front and kept in place by a silk scarf wound around the waist several times."

Here in Solo, the old and the new in dress are often found in startling contrasts. At the court festivals held here, it is possible to see groups of Javanese nobles, some in the modified European attire and others in the ancient court dress of the country. During our stay we were invited to an evening reception given by the prime minister of the Sultan and all the native men present as guests, wore the modified European costume. At least once a year the Prince gives a great entertainment when he disposes a truly royal hospitality. Hundreds of natives and Europeans are invited to the festival and the best actors and dancers are engaged. After one of these entertainments it is said all sorts of table ware and bric-à-brac are offered for sale in the city—a result of the wholesale thefts on the part of the servants who seldom receive any pay and take this means to "get even." It is said some one remonstrated with the Sultan for permitting this condition of affairs to exist, and he is said to have answered: "Who can my people steal from, if they cannot steal from me?"

From Solo we made an interesting excursion to the ruins of the Buddhistic temples at Brambanam which are believed to date from the ninth century and form eloquent monuments of the grandeur of the period of Hindoo dominion in Java.

We first visited what remains of the temples dedicated to Lara Jonggran, known in India as the Goddess Durga. Passing the remains of three circular walls, we arrive at the inner area which embraces the ruins of eight pyramidal structures. One of these contains, in one of its four compartments the eight-armed bronze figure of the Goddess which gives the temple its name. A broken statue of her consort Siva stands in the inner chamber of this temple, while in the western chamber sits a striking image of Ganesha, the elephant-headed God of wisdom. The images in another temple dedicated to Siva are especially notable for a certain dignity of expression and are in the main well preserved. In another group of ruins are found two sitting statues with a curious "water-fall" arrangement of the hair.

After an hour's repose in a rest house near the ruins, we entered carriages drawn by four stout little ponies and sped along over well-kept roads towards Djokjakarta, the seat of the second so-called independent prince. The main roads in this part of Java are lined with noble trees and the ride in the late afternoon was one of pure delight. We passed many villages and marvelled at the density of the population and the fertility of the land which nourished all these teeming millions.

Arriving at last at Djokjakarta, we established ourselves at a comfortable hostelry and put in two days in viewing the sights of this historic locality. This was the last citadel of native rule on the island and after the final conquest of this eastern empire in the Mataram war of 1825, Dutch control of Java became supreme. The present Sultan is nothing but a puppet king; but with the large annuity paid him he is able to maintain an outward show of royalty as is evidenced by a showily uniformed bodyguard and a small army of native officials.

These people are passionately devoted to the form of dramatic art known as the Wajang Wong and to the dances given by their Bejadas or ballet troupes. Some of my readers will doubtless recall having seen the performances of one of these troupes at the Chicago World's Fair. Their dancing is of the measured, serpentine style with many graceful turns of the hand and postures of the body. No account of Java would be complete without some reference to the Wajang Wong. There are two forms of these plays, one in which leather puppets are employed and the shadows of these puppets are thrown on a curtain and the talking is done by a man behind the scenes. In the other form of this drama the characters are taken by living persons. In both instances the plays deal with mythological subjects and serve to perpetuate the ancient epics and legends of the people. I attended one of these performances at the house of a rich native. Of the seven actors four were women and music was furnished by five performers. The leader of the orchestra recited the words of the archaic drama, modulating his voice according to the character. All the actors wore masks with prominent hawk-like profiles. The action of the play related to the doings of gods and mortals. The masks were of different colors: gold for gods, white for giants or great men, red or black for devils, and brown for Javanese.

Just after sunrise one morning, we started in carriages for the site of the most famous of all the ruins at Boro Boedoer. It was exhilerating to roll along through this region of mid-Java illustrating the perfection of tropical landscapes. We encountered hundreds of natives hurrying along, carrying their burdens to a near-by Pasar or market. On reaching the village of Temple, where the market was held, while the horses were being changed, we had an opportunity to observe hundreds of these brown-skinned people trafficking in their farm produce and exchanging the gossip of the neighborhood. Resuming our journey we would come at intervals

Pasar or Market in Central Java.

General View of the Ruins of "Boro Boedoer."

upon villages buried away in the shade of dense tropical forests and whose existence was unsuspected until we arrived in their midst. Here, in his humble home, the happy, care-free native lives close to nature's heart and concerned with nothing but the performance of his share in the cultivation of the village rice fields.

The glories of Boro Boedoer have been amplified by every traveller who has visited this ancient shrine and it would take an entire paper to do justice to its many marvels.

I shall quote a short passage from a recent description of the ruin: "The temple, which is believed to have been built during the end of the ninth century, was not discovered until the period of English occupation, when it was partly laid bare by the removal of earth and ashes that had been heaped up against it during centuries of eruptions from neighboring volcanoes.

"Of its kind, the temple is probably the largest Buddhistic edifice in the world, its prominent position on the summit of a hill, above which it towers to a height of 120 feet, lending additional dignity to this marvellous pyramid. . . . The temple consists of a number of terraces, built on a square ground plan. Stairways lead to the top from each of the four sides. Rising from the summit is a Dagoba which contains a gigantic image of Buddha.

"An idea of the magnitude of the structure may be gained from the fact that there are over 988 bas reliefs in a good state of preservation, illustrating the life story of Buddha, while 441 images of Buddha, each within a small dagoba or shrine of its own, are still in existence."[2] The five lower terraces are of square design while the three upper terraces are circular.

We marvelled at the beauty and chasteness of the bas reliefs, copies of which attracted so much attention at the Paris Exposition of 1900. The latticed dagobas on the upper terraces are said to be quite unusual in design. "The whole is a splendid epitome of Buddhism just before its decline."

After our protracted sojourn in the rich lowlands of mid-Java, we were in the humor to enjoy a week's stay in the cooler air of a delightful little resort known as Garoet, situated in a wide valley in the southwestern part of the Preanger district, at an altitude of nearly 2400 feet above sea-level, and completely surrounded by volcanic peaks.

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[2] "A Cruise through Eastern Seas," p. 139 (Ed. Stanford, London, 1906).

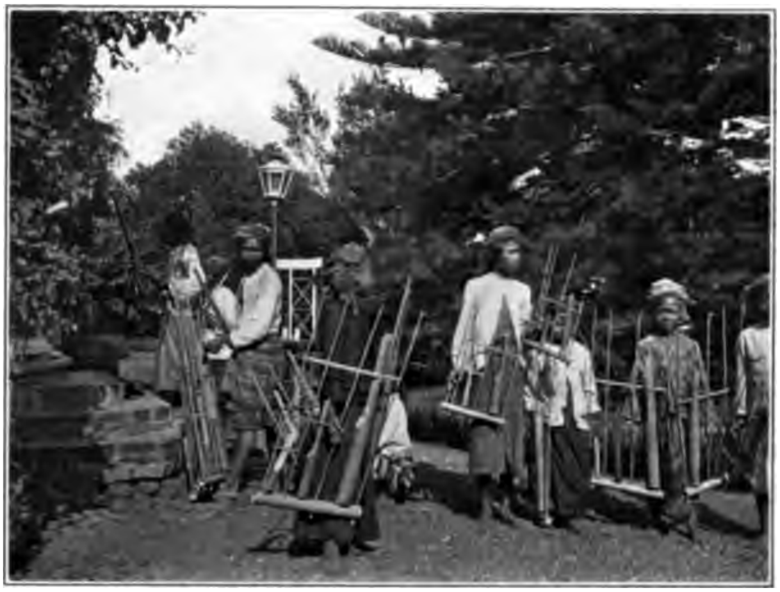
One of the pleasant features of travel throughout Java was the friendly attitude of the people toward us. Everywhere we were received with smiling faces and treated with courtesy. Every day during our stay at Garoet we were serenaded by a band of youthful musicians whose instruments were made of bamboo. By an ingenious sliding device when the position of the instrument was reversed, impact was made upon the cylinder of bamboo—thus each instrument made its individual note, and among them, they produced the complete octave.

Many charming excursions can be made from Garoet. I shall refer to one which we made to the crater of the volcano of Papandajan about seventeen miles distant. We had grown accustomed by this time to early starts, and so did not resent being called at half past three in the morning. An hour later we entered a wagonette-like vehicle drawn by three horses and drove southward over the undulating surface of the valley. The dawn came at length and we met many peasants on their way to begin their daily toil in the rice fields.

In Java rice is the staff of life and the energies of the people seem to be devoted more to its culture than to any other industry. On this drive we had an opportunity to see how it is harvested by the natives, who are apparently able to work all day under the burning sun without inconvenience.

Water is an absolute necessity to its successful culture, and the typical river scene represented in the illustration shows the source of irrigating canals which are led to an upper field from which the water is drained from one terrace to another. In fields where the rice had matured, we beheld numbers of peasants cutting the stalks with hand scythes in the old, old style which obtained in the days of the patriarchs.

Later the sheaves are bound in neat bundles and piled together in small stacks. The finest grade of rice is said to come from Japan, but Java rice is also highly esteemed in the markets of the world. In this land of dense population and struggle for the mere necessities of life, the human animal is the carrier of burdens and we found many troops of men transporting the rice to the storehouses. While walking about the village one day I met a company of women engaged in the same service—patient creatures performing their allotted tasks without a murmur.



Boy Musicians with Bamboo Instruments.

River Scene near Garoet.

But the sun is already making its presence felt and we have covered the first eleven miles of our journey and arrived at Tjiseroepan, a quaint village at the base of the volcano, with houses having peculiar steep roofs of thatch unlike those seen elsewhere. Beyond here it is impossible to go in a vehicle, and one must choose between a mountain pony and a palanquin.

The six-mile trail to the crater leads at first among coffee plantations and past fields of cinchona trees; but soon we leave all signs of cultivation behind and enter a true tropical jungle where nature seems to run riot in its many forms of beauty. All about us we see examples of tree-ferns with orchids clinging to their trunks, banks of giant lantana bushes, and occasional clusters of the purple trumpet flower of the deadly belladonna plant. Lofty, over-arching trees with huge creepers trailing from their branches, and groves of the graceful bamboo, made a lovely picture. As we approached the crater plant life became less prolific and finally gave place to a stony waste, where we crossed rivulets of hot, ill-smelling water. At length we dismount and clamber up the last few steps on foot to the rim of the crater. Following our native guide, we descend into the crater and make our way over the treacherous ground, which is very hot in places. We wonder at the stoicism of our guide, who wears no shoes on his feet. We make our way over the broken surface amid hot vapors, past many mud springs and vent holes, whence malodorous gases come forth. In a way, the place recalls the Devil's Kitchen in the Yellowstone National·Park although the Javanese name Papandajan, meaning "smithy," is just as descriptive in its way.

With many regrets, we leave Garoet with its cool airs and homelike hotel for Buitenzorg, passing on our way the celebrated plain of Leles, which furnishes an example of the elaborate system of land cultivation which prevails in Java.

Buitenzorg ("without care") has a charming situation 870 feet above sea level and contains the residence of the Governor General and the famous Botanical Garden. First impressions count for much, and in this instance the view from our hotel window of the river valley sweeping down from the slopes of Salak mountain was one worth remembering. A short walk brings us to the Botanical Garden which we enter by a noble avenue of Kanari trees whose overarching branches form a vault of living green. The garden which comprises ninety acres, was established by the German naturalist Reinwardt in 1817. An annual grant of $50,000 is made by the government for its maintenance.

After visiting other celebrated gardens at Kew, Calcutta, Peradeniya, and the Castleton Gardens, nineteen miles north of Kingston, Jamaica, I cheerfully award the palm of excellence to this one, where man has done much but nature more to develop a veritable paradise of the horticulturist. Wherever one turns, charming vistas meet the eye, and we were especially interested in searching out the useful bread-fruit tree and the curious sausage and candle trees. The arrangement of the specimens in family groups adds much to the educational value of the garden.

In concluding these notes, it may be in order to say a word as to the relative success of the paternal colonial administration of the Dutch to which I have referred:

How has it affected the Javanese people and what is the future outlook for all these complaisant millions?

In this connection, I desire to quote some observations made recently by Dr. V. S. Clark in a report to the Bureau of Labor at Washington.[3] This authority on sociological conditions in the far East remarks:

"For a generation Java has been ruled philanthropically, with the welfare of the native population, the first and chief object in the eyes of its administrators. Quite opposite, and perhaps equally true judgments might be formed as to the success that has attended this effort to guide the destinies of a dependent nation.

"The Americans and the Dutch follow almost diametrically opposite policies of colonial administration. The latter discourage any attempt to Europeanize the natives. The Javanese are regarded as a people placed by nature in a state of permanent childhood.

"Their primitive institutions, their relations of class, even the manner of dress and habits of living of the common people, are sedulously guarded. . . . Little attention is paid to education. In other words, Holland has endeavored to confine her influence upon Java to purely material things. She has given the people roads and bridges, peace and justly administered civil laws. . . . Religious proselyting has been discouraged, if not forbidden. . . . The spiritual life of the people, such as it is, has not been affected by the contact of European thought.

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[3] Labor Conditions in Java. Bul. of the Bureau of Labor, No. 58, May, 1905, p. 948.

" The result has been an almost purely material one. Protected in their sole voluntary activity of obtaining food, the Javanese have eaten and reproduced. Java has been a breeding place for human beings, no individual of whom rose appreciably above his fellows or his progenitors. The result of a century of colonial administration is that there are now 29,000,000 people where a hundred years ago there were 3,000,000, all of them, so far as can be discovered, just like their ancestors. Among the 29,000,000 is not a single individual whose name is known to the world, or whose life has contributed anything of importance to the history of the human race."

When we consider the utter stagnation of the higher activities of these people, as shown by the writer just quoted, and contrast their position with that of the native races of British India—where education has brought a modicum of enlightenment and even a hope of local self government—the balance of credit viewed from ethical grounds cannot be said to rest with the Dutch. What the outcome will be of our own policy toward the Filipinos, a policy which seeks to impose upon these dependent people our own political system and culture—the future only can determine.

AMONG THE SOURCES OF THE SASKATCHEWAN AND ATHABASCA RIVERS.

MARY T. S. SCHÄFFER.

The primary reason for writing this paper is, that it may bear its quota of usefulness to any who may be inclined to visit the section described. As to the location of the ground covered, from a glance at Dr. J. Norman Collie's map which accompanies his book —"Climbs and Explorations in the Canadian Rockies," it will be found to be bounded by latitudes 51′ 25″ to 52′ 25″, and longitudes 116′ to 118′. This is of course a rough outline, but it contains all the tributaries of those two great rivers of the north, which we visited. Our greatest trouble in the spring of 1907, was to obtain information which would be of even the smallest use in pointing out the way over such almost undescribed ground.[1]

Dr. Collie's book has summed up the work of himself and his friends, with that of previous workers in the same field, *i. e.*, the section lying between Laggan and Wilcox Pass; the Fortress Lake region and the Brazeau country belong to Dr. Coleman. As for the Yellow-head Pass, it is a matter of rather ancient history, having been described as far back as the days of Alexander Henry, an employee of the Northwest Fur Trading Co., who has left us an interesting diary, which covers the years between 1799 and 1814. The old history of the pass was of small practical use to us however, as it was the intervening valleys between this pass and the Kicking Horse Pass (that which the Canadian Pacific uses to-day), which we wished to explore.

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[1] In spite of a general knowledge of the subject, we were unable to get at the material, and not until after our return to civilization, were we fortunate enough to obtain literature and maps which would have been so valuable to us in the far wilderness. One who goes hence should carry Dr. Collie's map. This is easy to obtain, being published with his "Climbs and Explorations"; Outram's map which accompanies his work—"In the Heart of the Canadian Rockies," may be of equal value; Dr. A. P. Coleman's articles published in the *Royal Geographical Journals*, are of great use; and James McEvoy's report on the Government Geological Survey of that section is a most interesting pamphlet to have. From these few sources is to be culled all the practical information that can be found on the country.

To know that the expedition was a momentous one to those involved in its success, one has but to read the warnings of those who have gone before. We may well call it the "Inhospitable Land." A well-known hunting-country, many have gone into its fastnesses, only to be driven out by starvation, and the added sorrow of lost, starved, or drowned horses. Dr. Collie but voices that which may be read between the lines of all those who have written their experiences in this country. He says: "Jean Habel's outfit, like so many others, ran short of provisions and the expedition had to be curtailed; and much good work of exploration, which might otherwise have been accomplished, was thereby prevented. Some day perhaps, it will be possible to obtain an outfit manned and equipped with sufficient transport and provisions to last out a trip of three or four months. At present nobody seems to have mastered the problem; and the prospect of running short of food on the journey remains the most serious obstacle to all projects of extended exploration among the mountains."

That we would be tempted to dally day by day, we well knew, that the game was becoming, year by year, more scarce, previous trips and the hard experience of others had warned us; and the food problem became a very simple matter in arithmetic. As we had hopes of reaching most of the tributaries of the two rivers within the latitudes and longitudes given previously we reckoned food and clothing for four months. The season of 1907 was an uncommonly late one, and it was not till June 20, that we were able to leave all civilization behind and start for the higher passes. The morning of the twentieth, was anything but a typical June day, and the first twenty miles of the Bow trail were not what one might choose for a pleasure jaunt. It was spitting hail and snow, which struck not only our faces but deep into our souls; for those who had not the spirit of the wilds surging in their hearts, had prognosticated all sorts of mishaps, and if one were looking for "signs," they were about us in profusion. Our caravan consisted of eleven horses, one running light, that in case of chafed back or accident, there would be an extra one to use. This will seem an extravagance to many, but it proved to be one of the best investments in the entire outfit, as the appearance of our animals showed on our return to civilization, not a horse being out of commission, and every one of them capable of working four months longer.

The Bow trail to the summit of the pass, is at the present time, rather a discouraging proposition, but there is one satisfaction, it is one of the poorest bits of trail that is to be experienced throughout the entire trip. It was of course at its very worst this late June day, for the mountains were still discharging their winter snows into the soaked and over-flowing valleys. Dr. Collie's map, compiled from the work done by himself, Wilcox, Coleman, Drewry and McArthur, Noyes and Thompson, was our constant companion in the saddle. It is necessarily far from perfect, distances here and there being too long or too short, but a very good friend to have at all times. Often when the trail was dim or obscured, or completely lost, have I thought of and admired the men, who with only an occasional suggestion that the Indian hunter had been before them, fought their way through the discouraging valleys, found a passage round impassable gorges, and eventually reached the higher peaks of the Rocky Range.

The upper Bow Lakes and Bow Pass were the first plunge into fine scenery. If one may go no further, this is a trip worth taking. At the summit, where the spruces remind one of a great natural park, a short detour to the left leads over easy slopes to the cliffs which overhang Peyto Lake, the waters of which are the outpourings of the Wapta neve. It is the first glimpse of the Saskatchewan country.

Here at our feet Bear Creek (on some maps Mistaya (Bear) but never locally so-called) has its rise, flows north, taps the beautiful lakes known as the Waterfowl, goes rippling, and gurgling, and dancing along in happy oblivion to the superb panorama on both shores—Howse Peak, the stately Pyramid, the frowning Bungalow, and lastly Murchison, losing its final identity in the turbid Saskatchewan at the base of that great, wandering, outspread, pile of crags—Mt. Wilson. The days on Bear Creek grew hotter and hotter. We hurried along as fast as our heavily loaded horses would permit, knowing that each hour was adding inches to that angry, impetuous river and anxious to reach the other side before we had to swim for it. At 4 p. m., on June 25, we had crossed Bear Creek at its mouth (no easy matter when the water is high, for the river-bed is covered with huge bowlders) and faced the first serious proposition—crossing the Saskatchewan River. An excellent ford across the North Fork may be found about one mile west of Bear Creek, and we were in the nick of time, twenty-four hours later would have meant swimming.

With minds at rest, we camped that night on a high bluff overlooking the North Fork; behind us rose the high walls of Mt. Wilson, while Murchison, Sarbach, Pyramid, and the Freshfields died away in rosy, then purpling shadows; night came down, and we realized at last our utter isolation. The door was closed for many days to come to other companionship and the situation was saved from a sense of loneliness only by our minds being devoted absolutely to the destruction of mosquitoes, an occupation which lasted for several weeks. From Bear Creek to Wilcox Pass the scenery is a succession of beautiful pictures. About ten miles from the summit of the pass, the trail leaves the shingle-flats of the river and mounts a long and arduous hill, eventually reaching a point about 1000 feet above the valley, where the timber being scarce, the views of the receding and on-coming peaks are wonderfully fine. About three miles below "Camp Parker" (an easily recognized camp-ground at the junction of Nigel Creek and the North Fork), the now fast-diminishing river makes a deep plunge, forming what we have called "Panther Falls." Soon after passing the falls, Mt. Athabasca comes into sight on the left; being 11,900 feet high, and snow-clad, it is a joy even to eyes now so used to mountains. From "Camp Parker" to the main pass is about five miles, but a canyon beyond it being said to make that way impracticable, the trail to the true pass on the right, is a little hard to find. There is an old and much used camp among the spruces on the high meadows, called "Camp Expectation." Reaching this, the forest is skirted for a quarter of a mile, when a pebbly river-bed is reached; this is followed up for a short distance when a good trail to the pass is struck. This hidden trail is well worth a search, any other route is a hard grind for the horses.

The pass itself is long, heavy, ugly travelling; if the day be cloudy, it could not be more uninteresting, but being 7800 feet high, there is a fine view of Mt. Athabasca to the southwest, while to the north is seen the group of mountains climbed and named by Dr. Collie and his party.

The first drop on the north side of the pass, is a long sharp hill, where a well-marked trail leads to "Sheep Camp," a name well-known to hunters. By this camp runs a beautiful stream heading from Wilcox Pass, which we afterward named "Tangle Creek." Here the trail disappears as though it had dropped into the earth. It may help some future traveller to know that if he will cross this creek at the camp, bear well to the left in the forest, he will soon come upon a very good trail, which quickly leads to the Su Wapta in the valley below. Little Tangle Creek added quite a volume to the main river (an important branch of the Athabasca), and with its wide shingle-flats and guardian mountains on both sides, bore a strong resemblance to the Saskatchewan tributaries.

Unlike the Saskatchewan region, however, horse-feed here is limited and camp-grounds consequently scarce. The first possible stopping-place is at least two miles below the main Su Wapta canyon, and on the left side of the river. Even that is a very poor place, being but a small slough, with scarce feed enough for a dozen horses for one night. The next feeding place is found in the quick-sand belt, five to seven miles further down the river. This does not sound attractive for the horses, but unless it be early spring, there is little danger. This quick-sand is not a pleasing problem; it extends down the river at least three miles, and there being no way to go round, it must be traversed. Beyond it, and just north of the creek marked "Jonas" on the map, a large rock-slide of recent origin, gave us our next bit of study. It was soon navigated however by plowing through the muskeg on the west side of the river for at least four hundred yards, when we struck dry ground and a bit of a trail, and "going" was easy again. Beyond the rock-slide, Jonas Creek emptied its clear waters into the muddy Su Wapta, while a little further on, and flowing in a parallel direction, Pobokton Creek appeared from amidst the thick, green forest. Dr. Coleman, who named both creeks, told us later, that the names had been transposed on Collie's map, but for fear of still further misunderstanding—we let them alone. Beyond Pobokton (Owl) Creek, a long, rather low, rocky range marks the course of the main river for miles. For a day and a half we followed it in all its tiresomeness. Reaching the junction of the Su Wapta and the Athabasca, and seeing that it still continued in more or less broken form on down the Athabasca valley, we dubbed it "the Endless Chain."

The Athabasca at this junction, gave us no such impression of might and strength as the Saskatchewan at an equal distance from its source, the great ice-fields of the Columbia and surrounding peaks evidently contributed much more largely to the southern river.

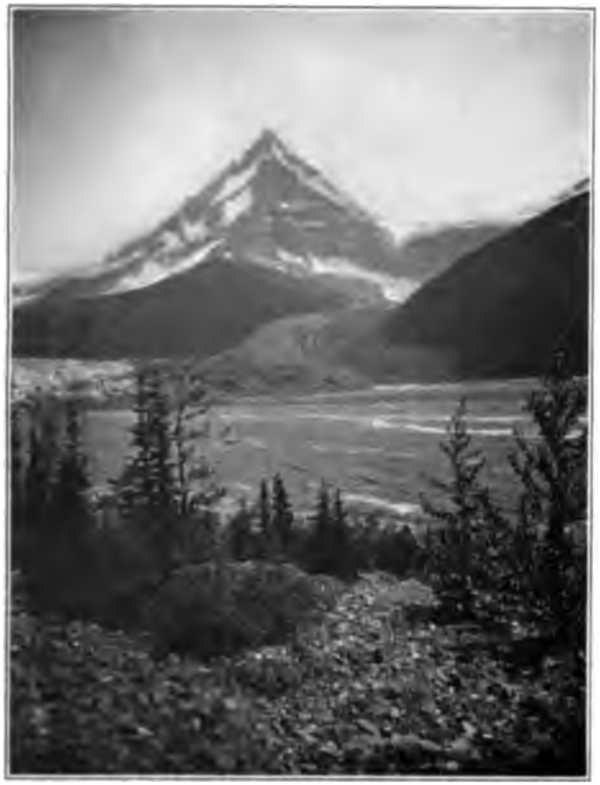
The Athabasca, at its source, is divided into three streams, and till they are reached at their junction, almost all scenic beauty is at a standstill. Not so the mosquitoes, deer-flies, bull-dogs, and caribou-flies; they were there by the millions to torment man and beast; but not even they could deter us from a desire to see Fortress Lake, discovered and named by Dr. Coleman in 1893, visited by Wilcox in 1896, and Habel in 1901.

In my diary I find this entry, "July 10, Indian Camp (our camps were all named to avoid confusion). The mosquitoes have shrieked and buzzed all night about our heads. If the number increases in direct ratio to the number of miles we go, at Fortress Lake we will be breathing and eating the pests." The words proved later to be almost a prophecy, though it was a matter of flies, not mosquitoes. While visiting the South or Columbia branch of the Athabasca, we were surrounded and overwhelmed, one evening at supper, by thousands of tiny flies, which though they did not bite, clung in clouds about us, drowned in our tea, became hopelessly entangled in the butter, died by hundreds in the apple-sauce, flew into ears, eyes, and nostrils, till we were distracted.

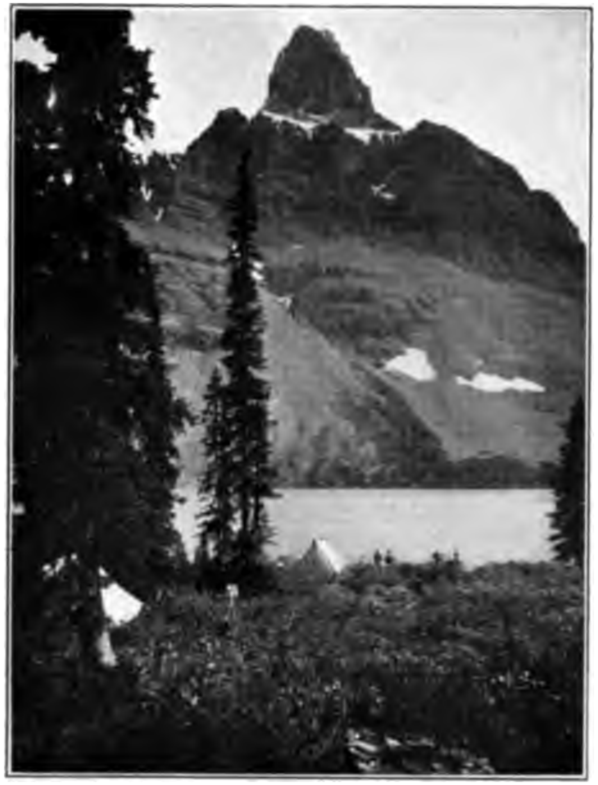
Having crossed the southeast branch of the Athabasca, we continued along the southwest branch, which Coleman has named the Chaba (beaver). Here we found a paradise for the horses, and made camp under the shadow of a noble crag, which proved later to be Fortress Mountain, and for which the lake was named. The lake being still an unknown quantity, the following day we made the ascent of a mountain (Mt. Quincy) opposite the Fortress and after a long, hot, weary scramble, Fortress Lake burst upon our sight, lying like an exquisite blue-green ribbon among the spruce-grown valleys below. It is about nine miles long, with an imposing mountain heavily covered with snow, rising at the far end. Habel has called it Mt. Blanc, while Wilcox seems to think it the long-lost Hooker.

Heavy thunder-showers prevented any photography worth mentioning, and we returned to camp to move our belongings to the shores of the lake. Beautiful as the lake in its exquisite setting is, it is no place for a permanent camp. The eastern end of the lake is a marsh, while the north and south shores are impenetrable owing to the dense forests and undergrowth. A raft was the only practical solution for reaching the western terminus and main outlet of the lake, and that was out of the question for us, as we had nothing with us but our valuable lash-ropes. Consequently we contented ourselves with a trip on our horses to the end of the Chaba valley, which proved to be about five miles long. Two miles south of the lake a stream joins the Chaba from the southeast and seems longer than the Chaba. The end of the Chaba valley is blocked by two fine glacier-tongues heavily covered with debris; a huge avalanche, 30 or 40 feet thick, choked the narrow gorge one half mile from the extreme end, on our visit in 1907 (Habel mentions the same in 1901) while beautiful water-falls on our right fell hundreds of feet from the precipices looming far above our heads.

Beautiful as Fortress Lake and her surrounding crags were, we were glad to say "good-bye" after thirty-six hours on her oozing inhospitable shores and turn our faces toward the more southeasterly branch of the Athabasca. To this stream we were particularly tempted by having seen from a distance, an uncommonly fine pyramidal, snow-capped peak, which we later decided could be no other than Collie's Mt. Columbia. Habel, who is the only other white person to have entered this valley so far as is known, records it in a short paper in *Appalachia* as "Gamma," and has reproduced with it a most striking picture. To the northeast of Columbia, a long spur juts out from that mountain, which we called "Edward the Seventh." The aspect of this valley is totally different from that of the Chaba. It is about 25 miles in length; the stream at the junction of the two rivers seems to be about one half the size it is twelve miles nearer its source (bespeaking an underground passage), while muskegs and bottomless mountain streams make the travelling wearisome for at least fifteen miles. The last day's ride was one of uncommon impressiveness, and I quote from my diary. "August 1. To-day the hill-sides on both right and left, were wooded to the base with rich, deep-green spruces, mountain-torrents like snowy threads peeped from amidst the foliage and the tumbling waters sent forth a music not to be surpassed. The thud of the horses' feet, the rushing of the glaciated river, and all else was silent. Columbia, which Collie reckons as 12,000 feet, loomed in pyramidal majesty at the end of the valley, while high surrounding peaks came and went as we crept along among the lower hills.



Mt. Columbia from the North.



Camp at Nashan-esen Lake at Thompson Pass.

Alberta, Wooley, Stutfield, Diadem, and other mountains figured in our names for the unknown summits, but our point of observation was far too low, to be at all certain of any of them. Caribou tracks grew more and more numerous; here and there teepee-poles on the open hill-sides bespoke the some-time presence of the Indian hunter. With no timber-work to impede our progress, we rapidly neared the base of Mt. Columbia. Our course lay across the wide shingle-flats, which then, at low water, was a garden of the pink Epilobium (*Chamænerion latifolium*) and here and there silvery cascades fell hundreds of feet down sheer cliffs."

About two miles north of Mt. Columbia, a much longer stream comes in from the west; this we explored the next day, but as usual, the clouds came down and obliterated everything of interest. Apparently there is a high mountain at the far end, and a glacier flowing from it, seems worthy of study. Having in our ignorance, dragged our horses to the base of Mt. Columbia, we quickly saw we must drag them away again on account of feed, so retired to two small islands four miles down the river, where a limited amount of slough-grass was found on the river's left. Throughout the entire Athabasca region this problem of feed was almost as serious as the rivers themselves. After waiting three days, we never got any particularly fine pictures of that wonderful mountain, being at all times either surrounded by clouds, or else steeped in flat sunshine.

From the Columbia Branch, we now traced our way back to the main Athabasca, and from there to the Su Wapta, where we went in search of the Su Wapta Gorge. We found it within a mile of the mouth, and though the whole country is a country of gorges, this one is uncommonly fine. The walls are probably 150 feet high, the water makes a plunge of 50 feet at the upper end, then rushes seething and boiling through a deep elbow-shaped cut. Some one has hewn and thrown three trees across the narrowest part of the gorge (perhaps 20 feet wide), and cut on a near-by tree the facetious notice, "No toll charged on this bridge." We had intended our next stopping-place to be Diadem Creek, where we hoped to climb and locate the peaks named by Collie's party in that section. This was however impossible as there was not a sign of horse-feed, and we were compelled to move on up the river for two miles where we went into camp for a couple of days. Here we ascended a creek to the fine glacier at its source, climbed a low mountain on the creek's left (about 9000 feet), and were undoubtedly in the midst of Wooley, Stutfield and Diadem, but which was which, it was hard to say with the limited description given by their sponsors. On August 16, we climbed Peak Wilcox (10,050 feet), and should have had an interesting view of the country we had just come from, and others to which we were bound—but for the usual clouds.

On August 17, we were camped at 7000 feet, just below Wilcox Pass. The morning opened with a regular, old-fashioned snowstorm, and the arrival at our tent-door of a total stranger before any one was awake. It was a queer sensation, looking out from one's sleeping-bag and seeing a man when there was no cause to think that such an object save our own guides were within a hundred miles of us. It proved to be Dr. Coleman's party, Dr. Coleman who had threaded the by-ways of so much of this country through which we had just been, and of whom we had spoken so often while in the mazes of the Athabasca sources.

It proved a pleasant meeting in spite of driving snows, and we parted—they for the Yellow-head Pass and we for the West Branch and the Brazeau country. "The West-Branch-of-the-North-Fork-of-the-Saskatchewan!" The most beautiful valley of all those we visited, and to go by such a name! May it some day receive its due; certain it is, it has not had it yet. It is essentially a valley of tumbling cascades and deep gorges, of muskegs and sloughs at its mouth, and shingle-flats at its source, with few good camp-grounds except *on* the pass. It runs in a straight line for about fifteen miles, when Mts. Alexandra, Gable and Lyell, with their snowy glaciers block the way. Here at right angles, another stream comes in direct from Thompson Pass and the Columbia ice-fields, about fifteen miles distant. To avoid the hard travelling which following the river involves, those who may follow in the future will find a hunter's shack about five miles east of the base of Gable Peak, on the river's left. Fifty yards to the east of it, they will strike into the mountain and there come upon a fairly good trail winding over the shoulder of the hill. No packs had ever been to the summit of the Thompson Pass before, and it took some careful work to get the loaded animals up and around the rock ridges which balked us every few yards. What a camp that was by the calm, deep-green lake, which lies at the foot of Outram's Watchman's Peak! Not even the sign of the indefatigable Indian hunter was visible, only the little people of the wilderness, whose trails were everywhere. We drank from the clear, cold waters, and named it " Nashan-esen " —Stoney for " Wolverine-go-quick," our friend the hunter— Simpson.

We found the task of taking the horses to the summit of Thompson Pass a much easier one than we had first hoped. It is very steep in places, but the rock ridges, running transversely to the valley, made good shelves for footing. A good camp ground will be found a few hundred feet below the 6800 foot summit, on the lake shore. A low spur of Mt. Bryce, altitude about 9000 feet, gave us that which we had come so far to see, a view of the great Columbia ice-fields. Stretching for thirty miles to the north, the sight was one never to be forgotten! So cold, so still, so silent and haughty in their supreme, icy beauty, they well repaid for all the hardships of reaching them. Outram says they contain at least 200 square miles, and it can well be believed, from our point of vantage there seemed no limit to the billows and billows of ice. It was a grand marshaling of the monarchs. We stood in the heart of the highest which the Rocky range has to give to those who love the hills; and at last I was willing to admit, that in spite of the drudgery and fatigue, there is a fascination in reaching the " top." The nipping winds however, stiffened our enthusiasm for even that wonderful sight; so with a brisk run down the sliding scree, a plunge through the low scrub, a few tumbles over the rocks, we were back at Nashan-esen Camp, and a delicious supper of bacon and beans.

As we emerged from the wonderful valley, in a downpour of rain, we christened it " Nashan-esen," hoping that " West-Branch-of-the-North-Fork " might some day be forgotten.

September 5, saw us heading for Nigel Pass and the Brazeau country. The trail lies on the river's left, and at the summit, it will be found to wind among the rocks on the south side of the pass. When once found, the way proved perfectly easy going, having no doubt been a very old Indian trail.

On the far side of the pass, one branch of the Brazeau has its rise; this branch we followed for about 30 miles to the Brazeau Lake, keeping on the river's left for the first ten miles, when what there is of trail, crosses to the right side, and eventually surmounts a long, hilly shoulder and drops down to the main river.

Brazeau Lake is a beautiful, aquamarine sheet of water about six miles long, whose low surrounding mountains, on that sunny morning of our introduction to it, were exquisitely reflected in its mirrored surface. We found a well-marked trail on its eastern shore, and every indication that it had long been a favorite hunting-ground of the Indians. Pushing on by an old and ideal camp-ground at the lower end of the lake, we camped that night at its northern extremity. Beyond the lake the valley extends for fully twelve miles. At its extreme limit rises a fine peak, which Coleman has called Mt. Brazeau, and though unclimbed, he reckons it at 11,000 feet or over. Tempted by an old but very good Indian trail, we followed it the next day, to the very limit of horse climbing, or close on to 9000 feet, and reached as dreary an alpine view as I ever saw. There was but one event to redeem and justify the expedition. The snow lay deep, even below tree-line, the icy winds whistled through the spruces, and shrieked past the bare rock ridges, and the low-hanging clouds obscured the higher and distant peaks. At last even the dying alpine flowers were left behind, and we crossed a rocky ridge to meet a band of mountain sheep. Surprised at our sudden coming, in the twinkling of an eye, they had scaled impossible cliffs covered with ice, and were gazing down upon us from 1000 feet above. The brave old ram, his head accentuated with a pair of magnificent horns, never flinched from his post, or removed his eye from the enemy, till in our descent, the lower jutting rocks hid us from view. Returning up the Brazeau River, we took a side trip to Jonas Pass, the stream from which flows into the Brazeau about five miles from Nigel Pass. This pass was tried by a white man in 1893, Dr. Coleman, when finding his way to the Yellowhead Pass; and excepting one hunter, I have heard of no one using it since. In many ways it is an improvement on the Wilcox Pass by which to reach the Athabasca, avoiding much that is disagreeable on the Su Wapta. To us at this late season of the year, it had no "tourist" charms. The summit of the pass was burdened with two, three, and even four feet of snow, which with the hard work on the horses, the brilliant glare on unprotected eyes from the snow, and the cutting, driving wind lashing our faces, seemed endless. A fine, solitary black bear, out for any belated berries, he might find beneath the snow, was the only bit of life to greet us on the great white silent stretch of loneliness.

September 21 saw us anxiously scanning the clouds and a rift in the hills to the south of us, from our camp on the Brazeau. We were to try still another new pass, the Cataract, and this also almost unknown except to Coleman. Being but 200 feet lower than "Jonas," or 7550 feet high, we had little to expect in the way of an open trail. It proved to be quite all that we could ask to get our horses through, and was even more tedious than "Jonas." The Indian trail through the forest is well marked, and had there been no snow, we might have found such a trail as that which goes over Nigel Pass; as it was, it was one long hard grind through fine, fluffy snow, which allowed the horses to sink almost to the rocks beneath, plunge forward, and sink again.

The south side of the pass is excessively tedious, as much of the way is avalanche-swept, and the apology for a trail is constantly blocked by fallen timbers. From the summit of the Pass to Pinto Lake is about fifteen miles. Here, owing to a pair of snow-blind eyes, we were forced to remain over a day; and as provisions were getting low, the guides reinforced by three of the strongest horses, pack-saddles, and ropes, crossed Pinto Pass to the junction of the North Fork and Nashan-esen Rivers, and returned that night with the food we had cached at that point. It was only a matter of thirty miles, but it was over a pass which even Dr. Coleman gave up attempting with horses after investigating it for that purpose.

We had traversed it the year before from the west to the east, but that was a different undertaking from this expedition, when the men were compelled to cut steps in the ice near the summit to enable the animals to get any foot-hold at all. Pinto Lake has long been a favorite fishing-ground for the Stoney Indians: they had just made a visitation to those waters, and as Indians always do, had cleaned out every fish that would rise to bait.

From Pinto Lake to the Kootenai Plains the trail follows Cataract Creek. It is a distance of about twenty-five miles to its junction with the main river, more or less uninteresting, and fire-swept from end to end. In the late fall the Saskatchewan is easy enough to ford where it divides into several channels near the base of the Sentinel Mountain. On the golden Kootenai Plains we rested and dallied among the Indians for a few days, then hurried to the junction of Bear Creek and the Saskatchewan, crossed that river and ascended the North Fork in search of a valley, which Outram mentions on his map, "The-Valley-of-the-Lakes." The entrance to this valley is quite nine miles from the mouth of the North Fork. At low water, a ford may be easily made opposite the rift in the hills, but at high water, can only be reached by crossing below on the main stream and following the west shore of the river. The trip though short, was an arduous one, and almost devoid of real interest. We found a very ancient Indian trail, which needed much circumnavigating and cutting, to get even our now depleted packs through; the growth was very heavy and the way consequently dark and gloomy. By a brawling, noisy little river, we made the only camp where a sign of feed seemed possible for the tired horses, and that in the midst of fallen timbers on the avalanche-swept hill-sides. Outram describes this valley as he saw it from the summit of Mt. Lyell, 11,500 feet below him; we saw it at 8000 feet, where we climbed the following day, the sun beating down upon us, and the surrounding clouds so low that Lyell and everything else interesting was utterly obscured. The lovely lakes were only sloughs after all and the chief joy of the trip proved to be that we had been the first travellers to break the spell of silence in that lonely cleft of the hills. It had been many years since an Indian had been there, and the only other sign of life, was the blow of the axe from a solitary white hunter who had passed in the dead of winter. It was now October 5, and Howse and Baker Passes, our return route, quite unknown. Up the Middle Fork and to the Howse Pass, was like reading ancient history. One hundred and fifty years ago, the Indians from the Kootenai country took this portion of the trail on their journey to the Saskatchewan Plains (hence the name Kootenai Plains), to trade with Kline of Jasper House. As far as Howse Pass, it was delightful trailing; being but 4800 feet, we were on and over almost before we knew, and soon tumbling down beside the merry, chattering Blaeberry River. The instant Howse Pass is crossed, the character of the vegetation changes, and the trail becomes impeded with heavy fallen timber and an almost tropical undergrowth. Government surveyors had preceded us in the fall of 1907, and though the way was not a bed of roses, miles and miles of fatiguing work had been saved our men as far as the "Hunter's Cabin."

Gable and Alexandra Glaciers in Nashan-esen Valley.

"Mummery" on Baker Pass.

On Dr. Collie's map, one has but to follow a plain red line, which turns to the left of the "Cabin"; and the Baker Pass seems the easiest thing imaginable. In reality, the Blaeberry is followed for two miles further after passing the second cabin (we never saw the first one), when the trail turns sharply to the left and winds up a hill-side. This emerges shortly on a very bowldery river-bed, which is to be crossed at the traveller's discretion, when Baker Pass with its trials and tribulations begins. Again I quote from my diary. "Quite ignorant of distances by this time, our horses having had but little feed for the last three days, and having already come ten miles since morning, we with only our saddle-animals pushed ahead with the injunction to stop for camp at the first sign of grass." It was quite noon, and we hurried along. The trail lay over a steep moss-covered slope, so steep there was no thought of riding; so steep, that place after place the horses would spring one and two feet to reach a bench above; so steep and continuous, that they were forced to cling to the hill-sides while resting.

Pack and saddle-horses were all soon in a dripping perspiration. Occasionally a call would come from behind, "Is there any end to it?" There seemed none. The way was clear and well blazed, we must be on the trail and on we climbed—climbed till we reached timber-line at five o'clock. Not a mouthful of feed had we passed since leaving "Trapper's Cabin"—blueberry-bushes and moss, no more. Were we even on Baker Pass, and if so, why had we climbed to this high point? *We* could have camped anywhere, it was our starving horses to whom our thoughts turned.

W., who had pulled us out of so many straits, went off to investigate; the time seemed interminable as we watched the slowly descending sun, now almost at the horizon. Mt. Mummery looked down upon us in icy indifference from across the valley, we stood clinging to the half frozen hill-side, while the weary, hungry horses, with drooping heads, tried to retain a foothold on the slippery, sliding mud. No one had had a mouthful of food since breakfast (we had come fully twenty miles), darkness would soon be upon us, we were 7200 feet above sea-level, and under the circumstances, no one could honestly say he felt cheerful. Then W. returned with the good news that though he was not positive we were on the right track, he saw a slough in a valley below, with indications of feed, and he thought we might reach it before dark. We forgot hunger, mud, cold, everything but that grass below; and as though the horses had understood, with us, plunged down a long, mossy gully, in a very few minutes dropping 1000 feet to a tiny stream which was flowing exactly as we wished it to flow. The sight of a horse's imprint cheered us; off came the packs, " no hobbles to-night, there is grass in plenty, and wherever we be, there are two days' rest for our faithful friends." The next day disclosed the fact that we had really struck the Baker Pass, were right on it in fact; but after studying the map and the hours of travel the day before we found the map made the distance about ten miles, while we had travelled twenty. Under the circumstances it seemed rather excusable, that for once we had felt a sensation of being lost. Climbing a shoulder of Mt. Habel the next day, we soon had our bearings, looked down into the " Gap " and upon an exquisite little lake poised high on a shoulder nearest the Yoho; to the north, Mummery and Forbes. With binoculars we could see the cairns on Collie and the Vice-President; and into the Beaver-tail Valley—our way home.

GEOGRAPHICAL NOTES AND NEWS

The project of the Argentine Government to establish a meteorological station on Wandel Island will probably have to be abandoned for the present, as according to the *Scottish Geographical Magazine* the ship *Astral*, having on board the necessary instruments for the station, was wrecked at the beginning of her voyage to the South.

In the spring of 1907, Dr. J. Elberts, the German geologist, conducted an expedition to the valley of the Solo River in Java, for the purpose of examining the fossiliferous deposits, where Professor Dubois, some years ago, discovered a remarkable skull of an anthropoid ape (*Pithecanthropus erectus*), which possessed certain human characteristics and aroused much discussion at the time. No authoritative report of the results of the recent expedition has appeared; but *Nature* intimates that although no remains were found identical with the Dubois specimen, yet according to a correspondent of the *Pall Mall Gazette* Dr. Elberts found roughly fashioned implements of bone and "a fireplace, and the remains of extinct animals, from which he became convinced that the ape-man must have existed at a remoter period."

It is reported that Lieutenant Shackleton, after an unsuccessful trial, has temporarily given up his attempt to reach the South Pole.

A communication received by the Royal Society, London, confirms the report that Dr. Sven Hedin has located the ultimate sources of the Brahmaputra, Sutlej and Indus rivers.

The French oceanographer Bénard, according to *Le Journal*, is completing his plans for an expedition to the Arctic to carry on investigations in oceanography and marine meteorology.

The *Revue Scientifique* reports the organization of a meteorological expedition by the Belgian government to start for the Arctic this summer.

The Antarctic expedition under Dr. Jean Charcot, which expects to start in July, intends to use motor sledges in its work.

Mr. George G. Chisholm has been appointed Lecturer on Geography at Edinburgh University.

It is reported by *Science* that a stock company has been formed to develop electric power from the tidal flow at the mouth of the Elbe.

In connection with the approaching International Tuberculosis Congress to be held in Washington, the Smithsonian Institution has offered a prize of $1,500, under the terms of the Hodgkins Fund, for the best monograph on the "relation of atmospheric air to tuberculosis."

The Fourth International Fishery Congress will be held in Washington, September 22 to 26, 1908. The importance of the fisheries to this country and the prominence of fish cultural work at this time ought to attract widespread interest and support to the Fourth Congress which promises to be the greatest ever held.

Mr. W. A. Dupuy has contributed in the March issue of *World's Work* a very able exposition of the reservoir system for flood control as advocated by Mr. M. O. Leighton, Chief Hydrographer of the Geological Survey. The article is especially interesting as demonstrating absolutely the feasibility of this much discussed system.

ACTIVITIES OF THE SOCIETY

SOME UNKNOWN RUINS IN YUCATAN

ADDRESS BY

COUNT MAURICE DE PÉRIGNY

January 8, 1908.

Count de Périgny told of the results of his extended travels through the ruins of Yucatan. Though the remains of the so-called temples, domiciles and pyramids, built by the civilized Mayas do not date back more than 1000 years probably, they contain much of interest to the student of archæology. Yucatan is especially rich in such remains of a past civilization. Count Périgny has visited and studied many of them, and supplemented his descriptions by a large number of illustrations of the more famous and important, but rarely visited, ruins.

ANNUAL DINNER

January 23, 1908.

The annual dinner of the Geographical Society was held at the Hotel Walton on Thursday, January 23, 1908, at seven o'clock, when one hundred and forty-two members and guests assembled for a pleasant reunion. The president of the society, Mr. Alba B. Johnson, acted as toastmaster, prefacing his introduction of the speakers with appropriate remarks. In his official position as mayor, Hon. John E. Reyburn responded to "The City of Philadelphia," followed by Dr. Leo S. Rowe, of the University of Pennsylvania, whose recent visits to South America admirably fitted him to enlarge on "Our South American Neighbors," giving an outline and suggestions as to future conditions and relations with them. Mrs. Harriet Chalmers Adams, of New York, added life to the picture with her charming description of "Journeys in South America."

Mr. Herbert L. Bridgman gave a clear and succinct account of "The Present Outlook for Polar Explorations," dwelling particularly on the prospective plans of Commander Robert E. Peary, U. S. N., who was unable to be present on account of the death of his friend, Mr. Morris K. Jesup.

The subject of "Women in Mountain Climbing" was freely descanted upon by Miss Annie S. Peck, of New York, who mentioned the names of all women who had essayed such diversion, she herself being prominent among them.

Descending from the mountain tops, the society was led by the Hon. J. Hampton Moore into "Inland Waterways," a communication highly desirable, and one to be persistently worked for, in the interest of commercial enterprise, as the speaker earnestly set forth.

Among the other guests of the society who were present were Professor William Libbey, of Princeton, N. J., and Mrs. Libbey, Mr. Wilfred Powell, British Consul, and Mrs. Powell, Mrs. John E. Reyburn, Mrs. J. Hampton Moore, Professor Charles L. Doolittle, of the Flower Observatory, University of Pennsylvania, and Mrs. Doolittle, and Mr. John Greenough, of the American Geographical Society. Rev. Charles Wood, D.D., made the prayer at the commencement of the dinner, and musicians behind a green bower played softly until time for the speeches. The five long tables were decorated with electric lights sunk in greens and the rich red of roses and poinsetta added a touch of color to the effect.

The committee in charge of the entertainment were Mr. Alba B. Johnson and Mrs. Johnson, Mr. J. Bell Austin, Miss Laura Bell, Mr. Henry G. Bryant, Mr. S. Hudson Chapman and Mrs. Chapman, Mr. Clarkson Clothier, Mr. Howard W. Du Bois, Mrs. William S. Hallowell, Mr. Benjamin R. Hoffman, Miss Mary S. Holmes, Mr. Emory R. Johnson, Dr. Theodore Le Boutillier and Mrs. LeBoutillier, Mrs. William M. Lybrand, Miss Elizabeth E. Massey and Mrs. Alden H. Weed.

THE ISLAND OF GUAM AND ITS PEOPLE

ADDRESS BY

MISS EMILY HALSEY SUYDAM

February 5, 1908.

This tiny speck of land, less than twice the size of Philadelphia, furnished the topic for a very interesting lecture by Miss Suydam. A residence of some duration in the island had made it possible for the speaker to become intimately familiar with many sides of the conditions and life there; a fact which was pleasingly reflected in Miss Suydam's ability to portray the place as it is. A number of excellent illustrations revealed the many charms of the place.

PERU AND MT. HUASCARAN

ADDRESS BY

MISS ANNIE S. PECK

March 19, 1908.

On Wednesday evening, March 19, 1908, a special meeting of the society was held, when Miss Annie S. Peck, of New York, was the speaker. "Peru and Mt. Huascaran" was the subject of the address, illustrated with very many slides, and as this is not a familiar region, not many expeditions having thus far been made to it, Miss Peck is practically alone in her would-be exploration of it. The large audience could not fail to be impressed with her persistence in the two or three attempts made to gain the summit, handicapped as she was with inexperienced guides, who could not be relied upon in emergencies, and who were inadequate for even ordinary mountain climbing. The summit of Mt. Huascaran has as yet not been attained, and the speaker announced her intention of returning to Peru with a suitable escort, as soon as possible, in order to carry out this project. A number of the slides were views of the fine mountain scenery of South America.

JAVA: THE GARDEN OF THE EAST

ADDRESS BY

MR. HENRY G. BRYANT

March 4, 1908.

Mr. Bryant who recently returned from a journey around the world told to a large audience the many beauties of Java. Of all the places which he visited in his travels Mr. Bryant said that the most beautiful was unquestionably the island of Java. This estimation was shared by all after hearing the speaker's impressions and seeing the large number of excellent colored pictures. Mr. Bryant's lecture is printed in this number of the BULLETIN.

BI-MONTHLY MEETINGS

ARCTIC AND ANTARCTIC PROBLEMS

Mr. Henry G. Bryant, *Chairman.*

The series of informal bi-monthly meetings was inaugurated, for the present season, on the evening of February 14 when, under the chairmanship of Mr. Henry G. Bryant, "The Arctic and Antarctic Regions" were discussed. The South Polar Regions first received attention. After a brief summary of the work of the earlier explorers, attention was called to the recent revival of interest in the far South as shown in the expeditions beginning with the voyage of *Belgica* in 1897–9 and further exemplified in the international efforts under commanders Scott, Nordenskiöld, Drygalsky and Bruce. A selection from the society's lantern slides was then shown, illustrating the physical aspects of Kerguelin Island. Tierra del Fuego and the region traversed by the Belgian Antarctic Expedition. The chairman of the meeting then presented a paper embodying a résumé of Arctic exploration from early days to the present-day activities of Peary and Amundsen. The subject was somewhat exhaustively treated from an historical viewpoint and was illustrated by characteristic views of the scenery, people and fauna and flora of the northland. Dr. H. Emerson Wetherill, surgeon and botanist of the Peary Auxiliary Expedition of 1894, discussed the flora of North Greenland. Dr. Theodore LeBoutillier exhibited a number of lantern views and Mr. Amos Bonsall gave some interesting reminiscences of his experiences in the North when a member of the Grinnell Expedition under Dr. Elisha K. Kane in 1853–5.

The following meetings are announced for April:

Wednesday, April 8th, Mr. Clarkson Clothier, "Japan."
Wednesday, April 15th, Mr. Thomas R Hill, "Alaska."
Wednesday, April 29th, Miss Laura Bell, "Italy."

BOOK NOTES AND REVIEWS

Abhedânanda, Swâmi. *The Gospel of Râmakrishna.* Pp. 436. The Vedanta Society, New York, 1907.

This little volume is the first authorized English translation of the teachings of the modern Hindu Saint Sri Râmakrishna who is widely worshipped in India as an ideal manifestation of the Divine Glory. The translation is made with the apparent desire to secure followers among the western nations where so many stand ready to adopt any new cult that appears.

Brown, Stewardson, and Schäffer, Mrs. Charles. *Alpine Flora of the Canadian Rocky Mountains.* Pp. xxxix + 353. G. P. Putnam's Sons, New York, 1907.

The rapidly increasing number of tourists to the Canadian Rockies makes this manual especially timely. It is essentially a guide to the diverse flora of the colder and drier Rockies as contrasted with that of the more humid Selkirks. It is interesting to note, however, that where similar conditions prevail similar plant forms have been found.

The manual will readily meet the demands of both expert and amateur. The different species are arranged in the usual order of relationship, while a complete key to genera and families, with a glossary and an elaborate index make it a most practical and serviceable volume for all.

Fourscore plates, many of them reproduced from water color drawings of beautiful execution, the handiwork of Mrs. Schäffer, greatly enhance the value of this very useful book.

Richard, L. *Geographie de l'Empire de Chine (Cours Supérieur) Changhai.* Imprimerie de la Mission Catholique à l'Orphinelat de T'ou-sè-wè. 1905. Droits de traduction et de reproduction réservés.

This geography was first prepared for the use of the Chinese scholars in the French schools in the Empire, and has been since amplified and made more complete and up-to-date in order that it may benefit older scholars, professors and compatriots who are interested in the conditions of China.

The difficulty in making foreigners comprehend shades of meaning has often caused repetition and involves uniformity in expression, and a methodical statement of the facts of physical geography is carried out in each chapter, dealing in turn with the eighteen provinces, and the characteristics of the region of the north, the south and center as well as of the coasts and the dependencies.

There have been so many recent changes in the political and economic geography of the empire that the writer states he has found it almost impossible to keep himself thoroughly informed of these changes up to the time of the volume being issued, but to the general reader, and to one who uses it for reference the book will furnish reliable information and statistics and also maps to consult and study.

The Chinese characters are used throughout for every geographical name and there are lists of the signification of these names; also alphabetical tables of all the towns of China, all of which serves to make this a valuable handbook of the geography of the empire. L. B.

Low, A. P. *The Cruise of the Neptune.* Government Printing Bureau, Ottawa. 1906.

To anyone interested in Hudson Bay and Arctic Islands regions, this report of the Dominion Government Expedition for the years 1903 and 1904 will prove most interesting and instructive. Accompanying the book is a large geological map of the district, with the route of the cruise clearly indicated, and if used in conjunction with the book and its numerous illustrations will give one a very clear idea of the geography of that section.

Briefly stated this book is really six in one:

The Log of the Trip—giving clearly a description of the small settlement, characteristics of the land and water, and its commercial possibilities.

The Eskimos—being a concise statement of the manners, customs, amusements and life during the entire year.

Geology—A scientific treatise of the formation of the rocks and the geological periods, including the glacial action.

Whaling—A historical sketch and description of the industry showing the great danger in the trade, and the rapid falling off in numbers.

Historical Summary of the Discoveries and Explorations in Arctic America from the voyage of Sir Martin Frobisher in 1576 to the return of Sverdup in the Fram in 1902. This historical sketch bears evidence of much research, and gives one a clear idea of what such men as Hudson, Baffin, Ross, Parry, Franklin, Kane, Nansen, Peary and about twenty-five other famous explorers accomplished in the frozen North.

Navigation of Hudson Bay. This question which has been before the Canadian Pacific for so many years is very clearly stated. Hudson Bay could be safely opened to navigation from the middle of July to November 1. Churchill, on the Western side of the Bay, could be connected by eight hundred miles of rail with Regina on the Canadian Pacific. The distance from Churchill to Liverpool is about the same as that from Montreal; consequently there is a saving in one thousand miles in favor of the Northern route. On account of the rapid development of the Northwest, this outlet is more than likely to be used before many years. A. W. R.

Rogers, J. D. *A Historical Geography of the British Colonies.* Vol. VI. Australasia. Pp. 440. Clarendon Press. 1907.

Interest in British colonies in Australasia is, of course, centered mainly in the two important possessions, Australia and New Zealand, and in answer to that interest the major portion of the present volume deals with those two 'colonies. The book is divided into two parts, I, Historical; II, Geographical. Such a division is necessary for ease of presentation. The author, however, has handled a difficult task most satisfactorily since at all times, he has thrown the emphasis on the proper physical basis for economic development No area in the world presents a closer interrelationship between geographical conditions and historical development. To have placed the geographical discussion first would have aided more in the historical analysis, the main purpose of the book.

Trower, Harold E. *The Book of Capri.* Pp. 345. Emil Prass, Naples. 1906.

This book by the British consular agent at Capri serves as a very complete historical and descriptive guide to Capri. It describes briefly the physical features of the region, and then goes fully into the history of Capri from early Roman times down to the present. A number of unusually fine illustrations furnish examples of the famous Capri marbles.

RECENT ACCESSIONS TO THE LIBRARY OF THE SOCIETY

AMERICA—NORTH AND CENTRAL.

CANADA ....BROWN AND SCHÄFFER

Alpine Flora of the Canadian Rocky Mountains. By Stewardson Brown. Illustrated by Mrs. Charles Schäffer. New York: G. P. Putnam's Sons, 1907. *Presented by Mrs. Charles Schäffer.*

MEXICO .... DIENER

Reise in das Moderne Mexico. By Mietze Diener. Wien: A. Hartleben's Verlag, 1908. Illustrations and Map. *Presented by the Publisher.*

UNITED STATES..VARIOUS AUTHORS

Picturesque America. Various Authors. New York: D. Appleton & Co., 1872–74. 2 vols. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

American Waterways. Various Authors. (Vol. 31, no. 1—Annals of the American Academy of Political and Social Science.) Philadelphia. 1908. *Presented by the American Academy of Political and Social Science.*

WEST INDIES—MARTINIQUE ....LACROIX

La Montagne Pelée et ses Eruptions. By A. Lecroix. Paris: Masson & Co., 1904. Illustrations and Maps. *Presented by the estate of the late Prof. Angelo Heilprin.*

AMERICA—SOUTH.

COLOMBIA AND VENEZUELA ....SCRUGGS

The Colombian and Venezuelan Republics. By William L. Scruggs. Boston: Little, Brown & Co., 1905. Illustrations and Maps. *Presented by the estate of the late Prof. Angelo Heilprin.*

SOUTH AMERICA .... MARTIN

Through Five Republics of South America. By Percy F. Martin. New York: Dodd, Mead & Co., 1906. Illustrations and Maps. *Presented by the estate of the late Prof. Angelo Heilprin.*

ASIA.

AFGHANISTAN .... HAMILTON

Afghanistan. By Angus Hamilton. New York: Charles Scribner's Sons, 1906. Illustrtaions and Maps. *Presented by the Publishers.*

INDIA .... ABHEDANANDA

The Gospel of Râmakrishna. Edited by Swâmi Abhedananda. New York. The Vedanta Society, 1907. Illustrations. *Presented by the Publishers.*

JAPAN .... HAWKS

Narrative of the Expedition of an American Squadron to the China Seas and Japan. Compiled from the original notes and journals of Commodore Perry by Francis L. Hawks. Washington: U. S. Congress, 1856. Illustrations and Maps. *Presented by Mrs. Henry E. Houpt.*

SIAM ....LAJONQUIERE

Le Siam et les Siamois. By Lunet de Lajonquiere. Paris: Armand Colin, 1906. *Presented by the Publisher.*

PALESTINE .... WILSON

Picturesque Palestine. Edited by Col. Wilson. New York: D. Appleton & Co., 1881–83. 2 vols. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

EUROPE.

EUROPE .... TAYLOR

Picturesque Europe. Edited by Bayard Taylor. New York: D. Appleton & Co., 1875–79. 3 vols. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

ITALY—CAPRI .... TROWER

The Book of Capri. By Harold E. Trower. Naples: Emil Prass, 1906. Illustrations. *Presented by the Author.*

Rome. By Francis Wey. London: Chapman & Hall, 1875. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

FRANCE—NORMANDY .... BECKE

Sketches from Normandy. By Louis Becke. Philadelphia: J. B. Lippincott Co., 1907. *Presented by the Publishers.*

Southern France, including Corsica. By Karl Baedeker. Leipzig: Karl Baedeker, 1907. Maps and Plans. *Presented by the Author.*

Some Summer Resorts in the South of France. By John W. Potter. Nice: Galignani Library, 1907. *Presented by the Author.*

SPAIN .... DORÉ

Spain. By Gustav Doré. New York: Scribner, Welford & Armstrong, 1876. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

SWITZERLAND .... RADEN

Switzerland, its Mountains and Valleys. By Woldemar Raden. London: Bickers & Son, 1878. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

THE RHINE .... STIELER, ETC.

The Rhine from its Source to the Sea. By Karl Stieler and others. Translated by G. C. T. Bartley. London: Bickers & Son, 1878. Illustrations. *Presented by the estate of the late Miss Adeline S. Tryon.*

OCEANICA AND THE POLAR REGIONS.

ARCTIC REGIONS .... AMEDEO

On the "Polar Star" in the Arctic Seas. By Luigi Amedeo. London: Hutchinson & Co., 1903. 2 vols. Translated by Wm. Le Queux.

Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

No Man's Land. By Martin Conway. Cambridge: University Press, 1906. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

The Ziegler Polar Expedition, 1903-1905. Scientific Results. Anthony Fiala, Commander. Edited by John A. Fleming. Washington: 1907. ***Presented by the estate of William Ziegler.***

Arctic Exploration. By J. Douglas Hoare. New York: E. P. Dutton & Co., 1906. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

AUSTRALASIA—NEW BRITAIN .... POWELL

Wanderings in a Wild Country. By Wilfred Powell. London: Sampson Low, Marston, Searle & Rivington, 1884. ***Presented by the Author.***

A Historical Geography of the British Colonies. Vol. 6—Australasia. By J. D. Rogers. Oxford: Clarendon Press, 1907. Maps. ***Presented by the Publishers.***

PHILIPPINE ISLANDS .... FOREMAN

The Philippine Islands. By John Foreman. New York: Charles Scribner's Sons, 1899. ***Presented by the estate of the late Prof. Angelo Heilprin.***

GEOGRAPHY.

GEOGRAPHY—PHYSICAL .... SUESS

The Face of the Earth. By Eduard Suess. Translated by Hertha B. C. Sollas. Oxford: Clarendon Press, 1904-06. 2 vols. Illustrations, Maps and Plans. ***Presented by the estate of the late Prof. Angelo Heilprin.***

Weltall und Menscheit. Edited by Hans Kraemer. Leipzig, Deutsches Verlaghaus Bong & Co. 5 vols. ***Presented by the estate of the late Prof. Angelo Heilprin.***

The Earth and its Inhabitants. By Elisee Reclus. New York: D. Appleton & Co., 1890-95. 5 vols.—21 parts. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

Die Erde und das Leben. By Friedrich Ratzel. Leipzig. Bibliographisches Institut, 1901-02. 2 vols. Illustrations. ***Presented by the estate of the late Prof. Angelo Heilprin.***

Sievers Amerika. Sievers Europa. Edited by Wilhelm Sievers. Leipzig: Bibliographisches Institut, 1894-97. 2 vols. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

Stanford's Compendium of Geography. 12 vols. London: Edward Stanford, 1893-1902. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

MISCELLANEOUS.

Brockhaus Konversations Lexikon. Leipzig: F. A. Brockhaus, 1901-03. 17 vols. Illustrations and Maps. ***Presented by the estate of the late Prof. Angelo Heilprin.***

MAPS.

Pilot Charts of the N. Atlantic Ocean for Sept., Oct., Nov. and Dec., 1907, and Jan. and Feb., 1908.

Pilot Charts of the N. Pacific Ocean for Oct., Nov. and Dec., 1907, and Jan., Feb. and Mar., 1908.

PHILADELPHIA .... PAXTON

Plan of Philadelphia and its Environs, 1810. By John A. Paxton. Philadelphia: 1811. *Presented by R. C. Canby.*

JAPAN

Kaseda and Suzumisaki Sheets. Tokyo: 1906–07. *Presented by the Imperial Geological Survey.*

NOTES ON NEWFOUNDLAND.

ELWOOD WORCESTER, PH.D., D.D.

I have often asked myself why the island of Newfoundland is not better known to the world in general, and I have found only two insufficient answers. It is very remote, and the climate is very uncertain. It is only necessary to survey the vast number of streams and lakes which cover nearly one-fourth of the surface of the island to realize the abundance of its rainfall. Rivers as large as the Delaware are called brooks, and lakes a hundred miles long, ponds. From my own experience I should say that on an average it rains about two days in the week in summer, and oftener at other seasons. Newfoundland is in every respect a land of contrasts. When it rains it rains as if it never intended to stop. The windows of heaven once open threaten never to close. Enormous, lazy clouds roll up in unlimited numbers, and apparently without the least exertion, run together and discharge vast volumes of water onto the earth. I cannot imagine a more desolate scene than Newfoundland presents on a rainy day. The mountains disappear, every familiar landmark is blotted out or revealed in vague and melancholy outlines, the whole world seems turning to water. The worst of such days is that one is usually ill prepared to endure them. However tight your tent may be, overhead, it ceases to be a shelter when you are obliged to sit or lie in three or four inches of water. As my poor friend Mike said, after a dreadful downpour in Labrador, where, on account of the absence of wood, we could make no fire—"Doctor, there ain't no comfort into it."

But, on the other hand, when it is fine, nowhere in the world is it finer. There is a peculiar lucidity in the atmosphere, a crystal clearness which causes one to underestimate all distances. On such days nothing can be sweeter than the air or more invigorating than the breeze. It is scarcely ever warm, and the nights and mornings are apt to be cold. During the month of July, when men and animals were dying of heat in America, we had great difficulty in keeping warm. Three pairs of the heaviest blankets, covered with a rubber blanket, were barely sufficient for comfort at night. In the early morning the sailors got out their earlaps and mittens, and we heavy overcoats and sweaters.

Apart from its bracing climate, the chief attraction of Newfoundland is the undying charm of its scenery. More than two-thirds of its coast consists of bold and rugged mountains, marked by great individuality and astonishing diversity. So numerous and so decided are the deflections of the coastline that it exceeds the bare perimeter of the island by nearly one-fourth. This circumstance strengthens the impression that the island in a peculiar sense belongs to the sea. Everywhere it either pushes its bold headlands into the ocean, or the sea enters it in the estuaries of rivers, in blue fiords, or in vast bays. In these places of refuge dwells practically the whole population, beside the sea, on which their lives are passed and which too often claims them in death. Go back almost anywhere half a mile from the water and you will find yourself alone, in a wilderness of forest and marsh. A large part of the interior has not even been explored.

Many of these bays are of exquisite beauty. On the western coast, the Bay of Islands and Bonne Bay in particular, for strength, variety, magnificence and sheer sublimity, have, I am persuaded, no superiors in the new world. Mountains and sea are mingled in superb confusion—everlasting motion opposed to everlasting rest. The various harmonizing or contrasting colors, the blue of the sea, the intense green of the islands, the strong brown and yellow tones of the mountains, the dazzling white of the snow-fields, combine to produce one of those perfect pictures that live in the memory, and to which the heart can always turn for consolation.

Starting from Philadelphia in July, I made my way to Digby, Nova Scotia, which I found as cool, as green, and as sunny as in past years. On leaving here my objective point was New Foundland, but as on that island each one must provide for himself, a good many preparations had to be made. The well-known ride through the Acadian Valley is always pleasant, so pleasant that one does not grumble that the "Flying Blue-Nose" flies only at the rate of about twenty-five miles an hour. The train is very comfortable, the passengers kind and friendly, and the conductor so accommodating that he will seldom refuse to stop the train near a particularly fine bank of wild flowers.

Photo By *H. G. Bryant*

BONNE BAY.

Photo By *H. G. Bryant.*

A TYPICAL SALMON RIVER.

On reaching Halifax the all-important problem of provisions presented itself. If you had to order all your meals for the next six weeks at once with the certainty that anything omitted would not be supplied later, you would probably have to think pretty hard to be certain that you had forgotten nothing essential to your health and happiness. The question of quantity is also important. Have you, for example, any idea of how many pounds of food you consumed last month? Probably more than you suspect. But when in addition to one's own needs those of the guides must be borne in mind, it becomes evident that so important a matter cannot be left to chance. All travelers into the wilderness have lists of provisions which they preserve from year to year, adding or subtracting as experience teaches. For example, this year we were induced to take along several cases of a Canadian substitute for shredded wheat which seemed to consist of sawdust treated by processes which took all the nourishment out of it. How many times we tried to eat that desiccated cereal, if such it was, toasted, buttered, or with milk, and how many times we gave up in despair of extracting the least advantage from it, I should not dare to say. Bacon and ham are always good and so is coffee at a greenwood breakfast table, while onions are simply delicious. At last all our stores were conveniently packed in small numbered boxes provided with hinges and our first anxiety was relieved.

Another important thing to be remembered on a trip like this is medicine. Of course, one hopes not to be ill, but then one may be, so it is best to be well provided against sickness, wounds and accidents. Besides one's own needs there are other human beings to be thought of in a country where drugs are almost unobtainable, and where such good old remedies as Pond's Extract, chloroform liniment, spirits of ammonia, cholera mixture and toothache drops are prized above rubies. If these words should happen to meet the eye of some young physician looking about for an opening, and who would like to begin with a large practice, I can tell him of a place where a good physician would be honored like a king, only he must take all his medicines, instruments and appliances with him. He must be a specialist in every department of medicine and surgery, and prepared for all emergencies, and be content to accept as his fees salt fish and lobsters.

One of the few sad things in such a trip is the suffering which one sees, but cannot relieve. One summer I had the good fortune to be in the company of one of our most skillful physicians, the kindest-hearted man in the world. How the news of his approach spread it would be difficult to say, but even in the most remote and lonely places the people had heard that the doctor was coming, and soon after our little vessel had cast anchor the boats would put off from the distant headlands and make their way to us, carrying their sick. The people still have the simple faith of the days of old that the prophet had but to lay his hand on them and they would be made whole. One or two of those scenes I shall not soon forget. One cold, stormy afternoon a little boat ran alongside containing two wretchedly ill-looking women. Each had wrapped up in a miserable shawl a baby. The boat was heaving, the air was so cold we could not remain on deck with comfort, the rain was pouring down and those two innocents, who must have been wet to the skin, were sound asleep in blessed ignorance of all their woes. They were evidently suffering from malnutrition, but to recommend a more generous diet was rather futile in face of the fact that the only obtainable food is bread, tea, codfish and lobsters. One night at one o'clock a boat manned by nine men came from a town a number of miles distant with the news that a boy was dying in fearful pain. As soon as the journey could be made we went to him only to see him breathe his last. What a work an educated physician of some means could do among this people! He could re-enact the beautiful scenes of Balzac's "Country Doctor," and die beloved and honored from one end of the country to the other. There are physicians and hospitals, of course, in St. John's, but I am speaking of the western coast.[1]

To return to our voyage. At Halifax we boarded the steamer Harlow, and I cannot help recommending this voyage to anyone fond of the sea. The sail through the Bras d'Or Lakes is charming, and the quaint Cape Breton towns are very attractive. After leaving Sydney the scenery, which has been sweet and pastoral, soon becomes magnificent. The northern coast of Cape Breton consists of a great wall of grey granite, which occasionally rises to form a towering mountain and sometimes is broken by a smiling bay crowned by enormous hills. Ingonish is one of the most romantic spots imaginable, an ideal retreat for lovers, also for lovers of the infinite,

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[1] The medical mission established by Dr. Wilfred T. Grenfell at Battle Harbor in 1892 has done much to alleviate conditions on the Labrador coast.—Ed.

Photo By *H. G. Bryant.*

IN HAWK'S BAY.

Photo By *H. G. Bryant.*

A FISHING SETTLEMENT.

remote, vast and solemn, where the pride of the mountains opposes the pride of the sea. We reached Cape North just as the sun was setting. A perpendicular cliff hundreds of feet high sweeps round the circle of the Bay. At the foot of the cliff were a few fishermen's huts, which looked like dolls' houses against the gigantic background of mountain, sea and sky. As we drew nearer we saw young girls in picturesque costumes carrying up the lobsters and fish from their boats, and we tried to imagine what their life might be in that retreat so absolutely secluded from the world.

On this coast, where steamships are infrequent and uncertain, practically the only way to move about is to go in your own vessel, carrying your own supplies. To facilitate our movements, therefore, after we got beyond steam navigation we chartered a little schooner, the "Stiletto," of about twenty-five tons, in which we cruised where we chose, going from one salmon river to another.

We were fortunate in having all the old tried and trusted ship's company, who have sailed with me before, and who have not their equals in their respective lines. The men's names I dare not mention, for if their virtues were known I fear I should never be able to get them again: Skipper Joe, who has navigated those dangerous waters for forty years, without losing a ship or a life; Mike I had employed before as a cook; he is about all that a man should be, clean, devout, honest, capable on land or sea (unless the sea is rough) and as brave as a lion. He is a man with whom, if necessary, one might trust one's life, and who would die without a second thought rather than betray a trust. The guide, Mattie, was a more composite character. He was a Mic Mac Indian, and the largest Indian I have ever seen, handsome, proud, absolutely graceful, and naturally eloquent, as all intelligent Indians are. As his life had been spent in the woods, amid adventures of every kind, his conversation was very interesting. He would begin one of his stories like this: "Y' see there was Eskimo man come from big fair in Tsecago (Chicago). Had one, two women and lot children. Brought back ten tousand dollar, twenty tousand present. He settle at Bonne Bay." "Well, Mattie, how did he like Chicago?" "How like Tsecago? No like Tsecago. Eskimo say Tsecago no good! too much money, Tsecago. Water too slippery, and de Eskimo man die when he get home." Indeed, I heard it asserted in several places that none of the Eskimos taken to the

World's Fair survived the change of food and climate more than a year.

After a white man has associated with an Indian for a month, the Indian, you may be confident, has taken his exact measure, while the white man knows as little what is going on in the Indian's soul as he knew at their first meeting.

While I am speaking of Mattie I want to give one or two examples of his wonderful skill as a pathfinder. Later in the season, when the days were growing short, I had gone with him to look for a caribou. For a long time we were unsuccessful, but just at dusk we spied a fine stag, feeding on the other side of a river. As the river was deep and swift, and as the stag stood in an open meadow, which afforded us no shelter, we had great difficulty in approaching him. At last, by crawling flat on the ground we managed to get within shooting distance and secured his superb antlers. By this time it was almost dark, and we had nearly six miles to travel through dense wood, over very uneven ground, to the camp. Those who have any idea of the difficulty of making one's way through a virgin forest at any time will understand our situation. The night was bitterly cold, sleet was falling, we had no axe and hence could make no fire, and we saw that it was out of the question to remain where we were for the night. As soon as this point was decided Mattie cheerfully took the lead, swinging through the woods like a great moose. Not once was he at a loss, not once did he stumble or fall as he felt his way through innumerable obstacles, not once, I believe, did he turn aside further than he was compelled to do. Crawling, climbing, gliding, he made his way up and down hills, around wind-falls and deep bogs, apparently giving no heed to direction, as in the pitchy darkness how could he? At last, after a fearful march of about three hours, we reached the edge of the woods within a hundred feet of the point at which we had entered them. Never did the cheerful flame of the camp fire look so welcome. Never were food and rest more grateful to me.

The other example of the man's sagacity is more thrilling. Last winter Mattie and three companions went hunting on the high range of mountains that skirt the coast to the north of Bonne Bay. Now these mountains have this peculiarity of configuration. For a distance of several miles they rise abruptly and nearly perpendicularly from the sea. Only at one point, a narrow gorge not more than a hundred yards wide—is there a break affording foothold for a man. To attempt to descend at any other point would result in certain death.

The four men had been walking on the tops of these mountains from morning until about one o'clock in search of caribou. About one, a sharp wind set in and it began to snow so furiously that they could see only a few feet before them. Instantly realizing how serious was their situation they began to turn their faces, as they supposed, toward home. As Mattie told it, "Dere was me and Tom Ryan and Manuel Kane and nudder man. I carry de load, see, and Manuel he go head, to find de way. Snow most up to our middle some places, and oder places bare, and de air so tick couldn't see noting. Byme by I look down in de snow and I see tobacco juice. Denn I 'fraid cause I know we goin in circle. Too late to get home dat way, and soon as we set down we freeze sure. Den I say, 'Boys I'm goin down over de mountain. If you want to follow me, doan you speak to me. Doan say noting. I got to tink.' So we walk long piece and doan see no more tobacco, and I know I got out of de circle and goin to de sea, and I look roun once, twice, and see de oder fellows following. Byme by Manuel he give out and go sleep, and I pick him up and carry him a piece. Towards night we come to edge of de cliffs and I hear de surf bawling most half a mile under our feet. So dark couldn't see noting, couldn't tell if dis de right place or not. But I tink I come straight. So I say, 'Now boys I brought you here, which one of you want to die first?' And Manuel, he say, 'Mattie, I most dead now. I go first.' So I say, 'All right. You jess jump over dat cliff an if you alive when you land you sing out.' Manuel, he say, 'Good bye boys,' and he jump over. We listen, seem like ten minutes. Denn he sing out, 'All right boys, come long,' and we all jump and crawl down de gulch. In 'bout half an hour we come to Manuel's house, and de old woman she have fire and kittle boilin."

We found almost all the rivers full of salmon at this time, but experienced some trouble through the fact that the people illegally stretched nets across the streams, which prevented the fish from mounting. On one fine stream an old woman had placed her net so that not a fish could get past. In front of the net the great salmon lay in rows and rascally little boys used to wade out and kill them with sticks. As a rule, when they saw us approaching they would fly to remove and conceal their nets, but occasionally we had to take them up ourselves.

On the whole the fishing was very good and in the earlier portion of our trip we saw many caribou. One fishing experience may be worth recording. On a certain fine little river at Mal Bay there was a small, deep pool only a few hundred feet from salt water. In that pool I had seen some immense Atlantic salmon leaping, but the difficulty was that just below the pool was a swift rapid and just above the pool was another piece of swift water. The pool itself was very inaccessible. One afternoon I managed to make my way to it and threw my fly over it. Instantly a fish of about twenty-five pounds rose and after making a few leaps and a tour around the pool, started for the sea. As soon as he reached the rapids, of course, he broke my hook. I tried it day after day with the same result. Each time I hooked a splendid fish, and each time he broke away in the rapid. It worried me so I was afraid of losing my health. I even contemplated the unsportsmanlike act of building a fence around the lower end of the pool, whose supply of salmon seemed inexhaustible. At last Mattie hit on a device. He went to the forest and cut a sapling to which he attached a very strong cord and two large hooks tied together. The next time I struck one of the monsters; before he had time to make his way to the rapid Mattie managed to slip his hook around the fish's tail. This was too much, and we drew him joyfully ashore.

On the whole, the trip was a great success. A man who loves nature, and who does not object to a few occasional hardships, can scarcely find a more interesting country than the northwestern coast of Newfoundland. Only he should be careful to take all he is likely to need with him.

Photo By *H. G. Bryant.*

A GOOD DAY'S WORK.

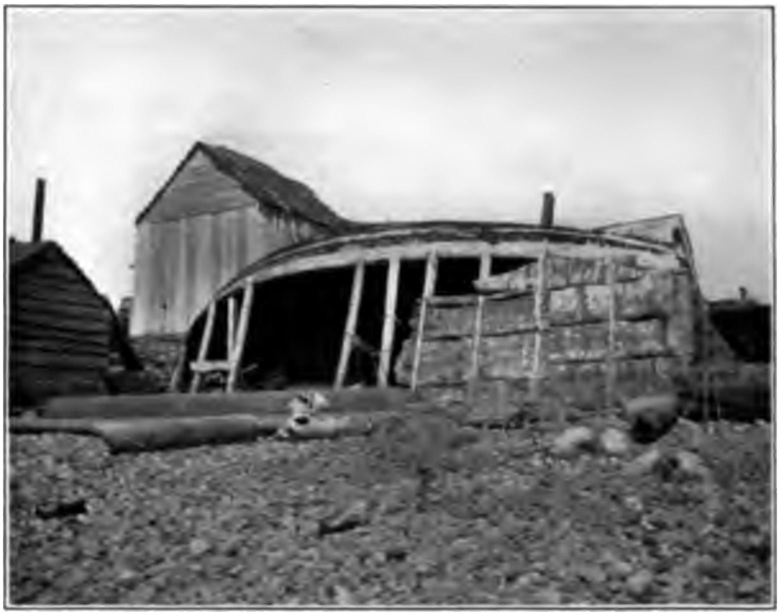

Photo By *H. G. Bryant.*

FISHERMEN'S HUTS.

THE MISSISSIPPI RIVER PROBLEM.[1]

WALTER SHELDON TOWER, PH.D.

The project for a deep waterway from the Great Lakes to the Gulf has been dreamed about and discussed intermittently for half a century, but nothing definite ever came of it until a little over a year ago, when, from a conference held at St. Louis, there was born the permanent organization called the "Lakes to the Gulf Deep Waterways Association." That this concerted movement came at the psychological moment has been indicated by subsequent events. Last winter the Rivers and Harbors Congress in session at Washington supported the project. The President in his Memphis address heartily endorsed the enterprise; shortly afterward his annual message called attention to the need for river improvement and the question is now in the hands of Congress with some definite action sure to come in the near future.

Within the last decade, this country has entered three fields of government activity, forest conservation, reclamation of arid and swamp lands and the building of the Isthmian Canal, the far-reaching results of which can scarcely be estimated at this time. The development of a ship channel through the Mississippi Valley, with feeding lines in the larger tributaries, would likewise be of such tremendous importance to the economic progress of the country that it must be ranked second to none in the list of great national policies.

A few simple statements of fact furnish striking evidence of the need for such a waterway. The drainage basin of the Mississippi system covers an area of approximately a million and a quarter square miles, or rather more than two fifths of the United States proper. This two fifths of the country is the real heart and soul of the nation's prosperity. With its development the United States has not only become independent of the rest of the world but also has risen with tremendous strides to stand as the greatest producer of foodstuffs that the world ever has seen or ever will see. More than half the total population of the country to-day is found in the score of states bordering directly on the navigable portions of the Mississippi system. As the population increases the most rapid growth must be in these same states, until a century hence with hundreds of millions of people living between the slopes of the Alleghenies and the Rockies, there will exist in the Mississippi Valley the highest and most permanent type of civilization in the history of man. Three fourths of the world's cotton crop is raised in the United States and the heart of the cotton belt must for all time lie in Mississippi, Louisiana and Texas. Our corn crop is three times as great as for the rest of the world combined, and, though corn is widely grown both north and south, the chief corn belt naturally centers in the Upper Mississippi and Ohio Valleys. For example, five states, Illinois, Iowa, Kansas, Nebraska and Missouri, raise over half the total for the country, or, astonishing as it may seem, nearly 40 per cent. of the entire world's crop. Wheat, cattle, hogs, vast quantities of oats, hay, potatoes, lumber, coal and other mineral products come mainly from the Mississippi Valley, each one in point of quantity leading all other nations of the world, and yet no one denies that the limit of productivity is far from being reached. Out of this list, cotton, meat products and bread-stuffs make up a large part of our foreign commerce, with half the world's mileage of railroads required to get the products to the seaports. As might be expected, by far the thickest railroad net is in the Mississippi Valley, yet the roads there have found their facilities increasingly inadequate to handle the produce of the region. "Shortage of cars" has become a familiar complaint in the wheat fields of the northwest. Corn and cotton in the states along the Mississippi have been kept out of the markets because of increased rates on rail shipments. On every side the farmers have raised the cry, "Better freight facilities," but the railroads have steadily failed to meet the demand. Conditions have gone from bad to worse until now the harassed producers see that their only salvation lies in the development of the routes so bountifully supplied by nature with coordination of rail and water facilities to prevent disastrous opposition.

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[1] Reprinted by permission from *Popular Science Monthly*, July, 1908.

It is not a case of providing merely enough to meet present needs, for the growth of this vast interior storehouse still continues with gigantic strides. Irrigation, dry farming, swamp drainage, and the exploration of the whole world to give new crop species, are opening every year areas which have heretofore produced little or nothing, while crop improvement and intelligent soil management are adding millions of bushels to the yield of the older regions. Marked by developments unparalleled in the history of the world, there seems to be no limit to the enormous capacity to produce over areas measured in tens of thousands of square miles: areas whose crops alone determine panic or prosperity for the entire nation; areas wherein lie the sinews of the greatest and most stable world power in all history. Not England, nor Russia, nor China, not any other nation or continent of the world can equal in all its territory the unbounded natural advantages of the Mississippi Basin. Yet with each added harvest the pinch of traffic congestion and heavy transportation charges are felt by an increasing proportion of the population, and as long as such conditions continue the full economic development of the region must be seriously hampered.

The logical solution of all the difficulties lies clearly enough in the utilization of the great arterial system of waterways afforded by the Mississippi and its tributaries. The time was when these rivers were the life currents of the region. In the days when river craft plied the Mississippi, Missouri and Ohio are found the conditions which gave birth to, and stimulated the growth of, St. Louis, Cincinnati, Louisville, Memphis, St. Joseph, Kansas City, Omaha and a host of other river cities of all sizes. To-day these cities are railroad centers, but by that very fact of having ready-made terminals the development of the water route takes on added value. Take, for example, St. Paul and Minneapolis, at the head of navigation on the Upper Mississippi, the greatest flour milling centers in the world, shippers of hundreds of thousand of tons for both home and foreign markets and at the same time the logical railroad centers for a large section of our own northwest and Canada. Kansas City, almost in the geographical center of the country and undoubtedly destined to become one of the greatest inland cities of the continent, with St. Joseph, Omaha and Sioux City, all lie in the range of former navigation on the Missouri and stand as important shipping centers for the great corn, wheat and cattle trade of the country back of them. The vast quantities of products handled at these places are mainly bulky goods which do not suffer seriously from relatively slow transit, but which do need most urgently the means of getting to market at the lowest possible transportation charge. No better illustration of the advantage of shipment by water can be found than that afforded by the coal trade from Pittsburg to points on the Mississippi. Coal can be sent from Pittsburg to New Orleans by river, 2,000 miles, for about 75 cents a ton, while the rate by rail to memphis, 807 miles, is over $3 per ton. On the basis of the charge per ton per mile, the latter rate is about ten times as heavy as the former, a fact which becomes strikingly significant when it is considered that a saving of a single mill per ton mile means $1,000 saved on every shipment of 1,000 tons going 1,000 miles. A similar saving on a comparatively small part of the annual cereal crop alone in those states bordering the Mississippi system would very soon reach a total surprisingly close to the entire cost of improving the navigation.

A waterway with a depth of fourteen feet from New Orleans to Chicago, with channels of less depth in the Ohio and Missouri, would almost unquestionably solve the problem of traffic congestion and high freight rates for a great area of the productive west. It would be a movement directly in line with the policies of various European nations, where far less valuable waterways in thickly settled districts have been utilized most profitably. It is an enterprise which the United States must inevitably undertake sooner or later as the density of population increases throughout the Mississippi Valley. Railroads, thoroughly equipped, yet inadequate to meet the conditions of the present time, will be relatively less able to cope with the rapidly growing demands for transportation facilities in the future. Already in the more densely populated portions of the country waterways once abandoned are being rehabilitated. The country can not long afford to ignore the possibilities presented by the development of the greatest natural highway in the world—the Mississippi and its navigable tributaries. It cannot be denied that the improvement of our greatest inland waterways will be followed by vastly more important industrial and commercial advantages than can ever result from the opening of the Panama Canal. These advantages would be not to the people of the Mississippi Valley alone, but to the people of every county and corner of the Union through their dependence on the products of this region.

The project, however, is not at all simple—it is an undertaking fraught with problems which, unless met rightly at the start, must inevitably defeat the entire purpose of improvement. Like all big rivers, the Mississippi and its tributaries have bad habits, the worst of which are devastating floods, followed by very low stages of water at other times; rapid changes in the course through sapping of the banks; and constant shifting of the channel, often over night, on account of the formation of sand bars. In these respects our rivers are not necessarily any worse than others, in fact, they are not so bad as many of the great rivers of the world, but the correction of these habits becomes an unavoidable and serious question when efficient improvement for navigation is undertaken. The question of river control and improvement is most intimately connected with forestry, farming, mining and other industries, since they in many cases largely determine the particular problems with which man must deal. In the Ohio the overwhelming spring floods and low water stages of summer are the chief difficulties, with slack water dams doing much to remedy the latter condition and make navigation possible at all times. The sand-bar evil in the Missouri is so great and so perplexing that it completely overshadows the question of flood control and sapping of banks, which are in themselves of no slight importance. Along the lower Mississippi from St. Louis to the Gulf all three problems urgently demand attention, since this portion of the river represents the trunk line of the entire deep waterways system; and it is just here that the physical conditions surrounding the river make correction or control the most difficult.

From St. Louis southward, the river course follows a broad alluvial plain, which gradually increases in width to about 100 miles near the Gulf. This broad river flat is composed of a soft, highly-productive soil, fine-grained and of indefinite depth, in which the river has developed such a tortuous course that while the air-line distance from Cairo to the Gulf is about six hundred miles, the journey by water is twice as long. On every one of the many turns and bends throughout the whole twelve hundred miles the river is constantly undermining and wearing away the outer bank of the channel in just the same way as the outer rail of a curve on a railroad is worn rapidly and must soon be replaced. The fine-grained, loose character of the soil greatly facilitates the undermining action, especially during the irresistible rush of flood waters.

This habit of eating away its banks is perhaps the worst which can be charged against the Lower Mississippi, and presents one of the most serious problems in the whole question of control. Needless to say the unceasing changing of the course is vitally important to the plantation owner, who sees his fertile land steadily vanishing, often at the rate of 300, 400 or more feet a year along his entire water front. It is still more important to the towns and shipping points located along the river. New Orleans is the only big city located directly on the river flat, and, fortunately for the city, it is at a place where the river's course is now comparatively straight. Other cities like Memphis, Vicksburg and Natchez are located on the high bluff where the river swings close against the eastern side of its valley. These latter towns have secured immunity from floods, but even simple changes in the channel would deprive them completely of their water fronts and strike fatal blows at their prosperity.

Even the present extent of the river traffic demands that there shall be more or less villages directly along the river and steamboat landings at various points, but every one of these places enjoys only a temporary existence. Since the river current hugs close along the outer side of every curve in its course, it follows that the deepest water, and hence the main channel, also lies near the outer bank. The natural result is that all steamboat landings and all important shipping points must be located on the outer banks of curves, as is found to be the case all along the river. The difficulty which lies therein is obvious enough, for with rapid undermining of the outer bank of all bends, the river is always tending to destroy the water front of every place so situated. The history of the landings below Cairo shows that practically every one of them has been driven back before the advancing river at the rate of 100 to 150 feet a year for the last quarter of a century.

That this condition is felt on a larger scale than by mere landings is shown by the case of Greenville, Mississippi. This city of nearly 8,000 people, the largest river port between Vicksburg and Memphis, is the flourishing commercial center for an important part of the lower valley, yet imminent ruin is even now staring it in the face. Greenville stands on the outer bank of a great curve in the river with three other curves up-stream from it. Narrow necks of land separate the different curves, and these necks are rapidly disappearing as the banks cave in. Twenty-five years ago at the curve farthest upstream from the city the neck was over 4,000 feet wide, five years ago it was less than half that width and was caving badly. The neck below the city is only half a mile wide and is also yielding rapidly to the attacks of the river. Greenville is confronted with these alternatives: If the neck below the city is cut through first by continued sapping, the city will be left high and dry, five miles from the river and its reason for existing will be gone. If, on the contrary, the neck above the city is the first to succumb, the resulting changes in the channel will cause most vigorous scouring of the bank exactly where Greenville stands and it will be speedily swept away. The levee now stands where the main street once ran and, despite every effort to stop it, the town has been forced to play leap frog over itself to keep away from the advancing river. Through the expenditure of a million dollars in protective devices the crisis has been delayed, yet the city is doomed eventually, and the money spent in its protection must be regarded as wasted.

St. Joseph, Missouri, with a population exceeding 100,000, and one of the most important centers of the west, faces a somewhat similar fate from the Missouri river. Opposite the city the stream swings around a great bend, St. Joseph being located on the bluff above the river bottoms. Some smaller villages on the flat have already been swallowed up in the stream, and, at its present rate, the current will soon cut its way through the narrow neck which lies a few miles west of the city, severing the Grand Island railroad, rendering the big steel bridges at St. Joseph practically useless, making new bridges over the new channel necessary, cutting off the intake of the water supply, and leaving the city without any outlet for its sewer system. Here again, somewhat over a million dollars have been spent in river work above and below the city, but the banks have continued to cave, and St. Joseph is facing the prospect of being left higher and drier than Greenville. From the standpoint of transportation by water, however, the loss of the river front at St. Joseph would not now be a serious calamity, since the Missouri route is at present rendered quite useless by the excessive formation of sand bars.

Both the federal government and the Chicago and Alton railroad have spent large sums in an attempt to control the Missouri at Glasgow. Kaskaskia, the one-time capital of Illinois, has been wiped out of existence by the changing current of the Mississippi, while the prospect of a cut-off at Cowpen Bend, above Natchez, indicates that the harbor of that city will be destroyed by the deposition of large quantities of sand along the entire water front. Striking as these individual cases may be in themselves, the question of this cutting away of the banks, accompanied by deposition of sand in other places, takes on far greater significance as soon as costly improvements are suggested. It is undeniable that what is happening along the river to-day is a true sample of what the river may be expected to do every day as long as the existing conditions prevail. A fourteen-foot channel presupposes important movements of goods from many points along the river. Large shipments can not be handled readily or economically without expensive modern terminal facilities along the river front, but the building of such terminal facilities can not be expected as long as they are threatened with the same fates as now confront Greenville, Natchez and St. Joseph.

The flood evil, the second great problem to be met in the control and improvement of the Mississippi system, has been fresh in the minds of every one since the disastrous spring of 1903, when the loss of property amounted to fifty or sixty million dollars. The flood problem applies not only to the main Mississippi itself, but perhaps even more vitally to its chief tributaries, the Missouri and Ohio, which must be regarded as the main feeders to any proposed improvement. The total loss from a few historic floods in these streams has been tremendous. In 1881 and 1882 the floods of the Ohio and Lower Mississippi caused a loss of $15,000,000. In 1884 the Ohio Valley alone suffered to the extent of $10,000,000. An area twice the size of New Jersey was laid waste along the lower Mississippi in the spring of 1897 with losses again reckoned in tens of millions of dollars. The unprecedented ravages of the Missouri came in May and June of 1903, and finally this last year saw damage to an extent estimated at not less than $100,000,000 in the Ohio Valley. In the last quarter of a century, therefore, the plain money loss from a single half-dozen floods approaches a quarter of a billion dollars, while the sum total from all floods must be acknowledged to equal many times over the entire cost of the most effective and permanent means of protection.

The principal cause of the floods in the Mississippi is heavy or prolonged rains at certain seasons of the year, a primal cause, which lies beyond the power of man to control, but which has been greatly aided in its effects by widespread deforestation about the headwaters. Flood conditions vary widely in the different tributaries. The Missouri has the largest drainage basin of any of the tributaries, about 540,000 square miles, but the average rainfall over the region is small, unusually heavy and long-continued rains are less frequent, and, because of porous soils and excessive evaporation, only a small part of the rainfall passes off in surface drainage. As a result of these conditions, the Missouri supplies only about one seventh the total discharge of the Mississippi, and is, on the whole, as regards floods, the least important of the large tributaries. The upper Mississippi, with a drainage area only a third as large as that of the Missouri, turns in about one fifth the total volume of the main stream, while the Ohio, draining approximately 200,000 square miles, sends down a third of all the water discharged by the Mississippi. These three rivers, therefore, yield over 60 per cent. of the gross volume, the remainder being divided between the White, Arkansas, St. Francis, Yazoo and Red rivers, which join the main stream too near the mouth to be important factors in the production of severe floods.

The Ohio is, on the whole, much the worst flood offender, partly because of its normally greater volume, and partly because of the conditions existing in the region it drains. The major portion of the areas drained by the Missouri and the upper Mississippi are distinctly less rugged than the Ohio basin, and over both areas the heaviest rainfall, coming in May and June, arrives at a season when the soil can take a large percentage of it. The largest tributaries of the Ohio, on the contrary, in etching their valleys in the surface of the Allegheny plateau, have produced the steepest and most rugged parts of the whole Appalachian region. Here the heaviest rainfall comes in January, February and March. Add to these factors the frequent complications of melting snow and frozen ground, which sheds water like a house roof, a district largely deforested, and the enormous destruction by sudden rising of the Ohio is explained. It is truly fortunate that by the provisions of nature the three rivers, the Ohio, the Mississippi and the Missouri have never been known, and probably never will be known, to be in extreme flood at the same time. Such an unhappy coincidence of high stages, if it came about, would quite certainly mean total obliteration for everything in the lower valley.

The flood evil is in a large way the underlying cause of most of the trouble in the Mississippi. At time of flood, the erosive power of the river is increased a hundredfold, caving of the banks is often excessive, levees situated rods from the channel before the flood and apparently safe are undermined, and the narrowing of necks between bends is greatly accelerated or quickly accomplished. Much of the damage from floods must be laid to the cavings of banks by which landings are destroyed and whole plantations are soon swept away, while through breaks in the undermined levees the raging waters sweep over the surrounding country. This spread of the flood is fostered by the fact that the river channel lies above the surrounding bottom lands. To the naked eye the region appears absolutely level, but from the river the broad plain slopes away at a rate varying from four to thirteen feet per mile. Once outside its channel, therefore, the water finds a natural course down hill into every part of the back country, carrying destruction wherever it goes. Unfortunately, this character of the river can not be altered; on the contrary, the more the river is confined between artificial levees and restricted in the area over which it is free to spread, the greater will be the devastation whenever a flood does occur, so that with the extension of the levee system the occurrence of floods becomes an increasingly serious problem. The recognition of this fact can not be urged too strongly, for until the flood waters are under absolute control, the construction of a deep channel, no matter whether it be in the river itself or in the form of a canal along the stream, must be done in the face of constant danger of having the entire system crippled and large portions destroyed whenever overflow takes place.

Again, when the river is in flood, as it is to a certain degree every year, it is carrying along the greatest amount of sediment, much of which represents the most fertile part of the soil. The total amount so carried is almost beyond conception, but to carry it by freight train would require 500 trains for every working-day in the year, each train consisting of fifty cars with a capacity of fifty tons. Besides this tremendous quantity poured out into the gulf every year, other incalculable masses are deposited as bars all along the course, and as the water falls to its normal level these bars are a constant menace to every form of navigation. The presence of these obstructions and their rapid shifting from day to day has always been one of the most serious handicaps to river transportation. In fact, the abandonment of navigation on the Missouri may be laid entirely to the utter inability to cope with the shifting sands. Deforestation, cultivation of the land especially and mining operations are vitally important in the question of soil washing, surface erosion and the amount of sediment in the streams.

The project for a deep waterway for commercial purposes, therefore, is confronted with these serious problems which must be solved before the government can afford to spend one or two hundred million dollars in river improvement. Some system of control must be devised to insure to water fronts and terminal facilities a reasonable degree of permanency through protection against erosion of the banks. There must be some way of checking disastrous floods which would in a single season, and perhaps year after year, destroy improvements costing millions of dollars—as the experience of some of the eastern canalized rivers indicates. The prevention of low water stages is no less important, since marked variations in the water level make it difficult to establish the necessary terminal facilities. Finally, the formation of sand bars must be stopped, otherwise it means stupendous, unending and probably ineffective, dredging operations in an attempt to keep the channel open.

If the Missouri could be removed from the list of tributaries by giving it a separate mouth, the sand bar problem would no longer exist, since that stream contributes over 60 per cent. of the total brought into the Mississippi. Reducing the load by 60 per cent. would certainly mean that the Mississippi could then keep its own channel clear. But the idea of providing a separate course for the Missouri from St. Louis to the Gulf is too daring even to be suggested. Moreover, it would remove from the immediate benefit of the deep waterways project those important communities which hope for renewed navigation on the Missouri.

If the entire lower Mississippi were given a new course free from sharp bends, as could be done readily by cutting through the successive necks, the sapping and caving of banks would cease and the distance from St. Louis to New Orleans would be lessened nearly by half. That this plan is entirely feasible is amply demonstrated by the success of the Germans in correcting and straightening the Rhine. The Rhine, if possible, presented a more difficult problem than does the Mississippi, but the German engineers recognized the fact that where sharp bends exist it is impossible to prevent entirely undermining and caving of the banks. Acting on this principle, it was decided to give the river a practically new course, less winding than the former, and in which future control is insured. Unfortunately, this procedure applied to the Mississippi would not be an adequate remedy for the floods, nor would it effectively prevent the formation of sand bars. It is unquestioned, however, that the flood stages would run off more rapidly and a greater amount of sand would be scoured from the channel, since in a shortened course the river would have a steeper descent and consequently a more rapid flow with increased carrying power. The corrected course undeniably has much to recommend it, aside from the mere facts of feasibility and a shorter route.

If the high water stages of floods could be prevented and the flow of the river controlled, the practical solution of the question would be at hand, for the major part of the sediment is washed into the streams incident to the flood time, and the excessive flood volume causes most of the caving of banks. For a good many years the federal government has been at work on the Mississippi, building levees to control or prevent floods, placing revetments along the banks to check the caving action, and operating powerful sand pumps to remove the shifting bars. It is estimated that in the last forty years the government has spent all of $225,000,000 on the Mississippi and its more important tributaries, not a single dollar of which has gone toward permanent improvement, except in the case of the jetties at the mouth, the slack water dams on the Ohio and the removal of rock ledges at a few points. Fifty million dollars of the total amount has gone into the construction of some 1,400 miles of levees and revetments along the lower course, but before the national government undertook the task of control, the states of Mississippi, Louisiana and Arkansas had already spent not less than $40,000,000 toward the same end. Enough similar work has been done at one time or another by private individuals, so that, first and last, the levee-revetment system to date represents an outlay of fully $100,000,000. Yet not one cent has been devoted to the control of the excessive floods which come almost every year in some of the tributaries, simply because the levee method can not be applied. It must be admitted that the levee system affords fairly efficient protection from ordinary floods, in so far as damage from overflow in the lower valley is concerned, but its desirability is seriously impaired by the fact that the levees must be constantly replaced. Just as long as the river is allowed to swing against its banks the soft alluvial soil will continue to cave in; levees originally built back from the channel are eventually undermined, rendered useless, and then in cases of high water stages, unless a second line of levees exists, the entire region is open to devastation. Until the sapping action of the river is under control there can be no such thing as a system of levees built once for all. Even the most optimistic advocates of this plan do not claim more than twenty to thirty years for the life of any levee.

It is undeniable that the army engineers in charge of the work have accomplished much in saving large areas from annual inundation, but they have not to any extent permanently improved the river as a highway of commerce. Furthermore, they have signally failed in the attempts to stop erosion of the banks, for past experience shows that no style of revetment yet devised will offer more than partial or brief protection from that action. In fifteen years some landings have been forced back more than a mile, and at important points where careful revetting has been done the retreat is said to have exceeded 1,000 feet. The levee-revetment system as now practiced may be the simplest way of protecting agricultural interests on the river flats, but it is certainly not the most economical in the end, nor does it in any way afford even a temporary solution of the great problems confronting navigation and river commerce. The heavy expense of maintenance must go on without end until the sum total of expenditure will aggregate vastly more than the cost of the proper, permanent remedy. The most serious of all the shortcomings charged against present methods, however, is that they do not strike at the root of the evils. The place to control floods is where they originate, in the tributaries, and thus protect both tributary and main valleys; as well try to fight fires by blowing away the smoke as to control the floods by levees along the lower course. To improve the river to the extent of a fourteen-foot channel to St. Louis would be a foolish waste of money as long as the levee-revetment system is the chief method of control.

Various other methods of control have been suggested from time to time, but most of them do not appear feasible or to offer the desired results. The rearrangement of tributaries, either by diversion or by addition, has been advocated, since the addition of tributaries to the Po very materially lessened the flood evil, the increased volume and velocity having caused a marked deepening and widening of the channel. In the Mississippi case, however, there are no important streams which could be added, and the only possible source of increased volume is by giving the Great Lakes an artificial outlet by way of the Illinois River. A certain amount of diversion or rearrangement of tributaries would be possible, though not very practicable, as in getting rid of the load of sediment from the Missouri, or in turning the Tennessee through the Big Hatchie River to reduce the Ohio floods. But in all of these radical schemes the possible benefits to be derived are far outweighed by the inevitable difficulties and disadvantages. It is unquestioned that the tributary system must remain as it is now.

The construction of artificial outlet channels to take off the excess volumes which produce floods has been suggested many times, and is seems likely that if constructed in sufficient numbers they would prove effective. There would, however, always be great difficulty in keeping the outlets sufficiently free from sand so that their usefulness should remain unimpaired. A second and more serious objection to the outlet scheme is that in the lower valley, where the flood control is most difficult and the flood damage most widespread, the outlets would have to be provided by turning the water over the low lying bottom lands. Outlet reservoirs could not be maintained because of the sand and mud with which they would be speedily filled. Under such conditions, therefore, the outlet plan clearly defeats one of the chief objects of flood control—the protection of rich plantations covering thousands of square miles on the river bottoms.

The solution by building a series of reservoirs in the headwaters of the chief tributaries appears to be the cheapest and most certain remedy for all these difficultis. By the construction of reservoirs the excess of water which produces flood stages could be impounded and held up with these important results: excessive and destructive high water stages could not occur, while, on the other hand, by regulating the discharge from the reservoirs, a more even flow of water could be maintained at all times, eliminating to a large degree the losses from diminished water supply, reduced power and fouling of streams incident to the low stages of late summer and early autumn. As soon as the irresistible rush of flood waters is stopped the sapping and caving of banks will be reduced to a minimum, with the efficiency of revetments increased many fold; finally, cutting down the flood volumes means a great diminution of the amount of sediment carried, and a marked alleviation of the sand bar evil. The reservoirs would, moreover, eliminate floods from the whole system, not merely from the lower course. The prevention of the annual flood damage in the Ohio would in itself be worth the cost of the reservoirs, yet until the work of control is carried to the headwaters no relief can be secured for that populous valley.

The solution by headwater reservoirs, of all proposed plans, has probably provoked the most discussion—on the one side those who regard it as impossible, or, at least, highly impracticable; on the other side, those who consider that it is not only feasible but at once the only proper remedy. It is admitted by every one that the topography of the country about the headwaters of the Mississippi system is especially well adapted to the construction of retention dams and reservoirs. The arguments advanced against this plan, though admitting this condition of favorable topography, maintain that sufficiently large reservoirs could not be constructed and made safe, or in other words, they would, through danger of bursting, be a constant menace to the whole valley below the retaining dam. Again it is argued that if this plan were adopted, the building of reservoirs would have to be done on an enormous scale, since destructive floods often result from local conditions, such as a swollen tributary superimposed on an already swollen river. This necessity for a widely-extended system of reservoirs, it is further claimed, would involve such tremendous expense as to make the adoption of the plan impossible. Most of these supposed objections are still based on a report made to Congress nearly fifty years ago, and, whether good or bad arguments then, there is no question that they do not apply now.

It is flying in the face of cold facts to contend any longer that reservoirs to retain the flood waters can not be built or not without danger to the entire valley below. The Ohio floods of 1907, the most disastrous for more than two decades, were due to an excess of water estimated at 23,000,000,000 cubic feet. To hold every drop of that excess discharge would have required a reservoir only a little more than half as big as the Pathfinder irrigation storage reservoir on the North Platte River in Wyoming, or one third the size of the reservoir in the Salt River project in Arizona. The Engle dam on the Rio Grande, a hundred miles north of El Paso, Texas, will impound about 120,000,000,000 cubic feet of water, equal to one sixtieth of the total annual discharge of the entire Mississippi system, or more than five times the quantity of water causing the most destructive Ohio flood in a score of years. These reservoirs are being built by the government at a cost of about $4,000,000 for the Pathfinder dam, $5,300,000 for the Salt River project and $7,200,000 for the Rio Grande reservoir. Furthermore, it is expressly stated by the Reclamation Service that the Wyoming reservoir and the Engle dam will absolutely control the worst floods which the North Platte and the Rio Grande have ever known, the latter of these streams having been a notorious offender in flood damage. The mere fact of being able to retain the flood waters in impounding reservoirs can no longer be denied, nor can the claim of danger from breaking dams be now advanced as a valid argument against this system. This government is most assuredly not spending millions in reclamation projects and encouraging thousands of people to take up irrigated lands if there is any remote likelihood of having homes, property and lives wiped out in floods from bursting reservoirs.

Granting, then, that the reservoirs are feasible, there still remains the question of expense in constructing the number necessary to place one or more in each of a score of the most important tributaries. Estimate the expense most generously, letting each one cost a third more than the Engle dam above El Paso, and the total figure then is less than what has already been spent on the Mississippi system. But there is another important factor to be considered—the tremendous possibilities which lie in the development of water power from each reservoir. The question of future motive power for industrial purposes, as the coal supply decreases, is a problem which must soon be met in this country, and probably will be solved by the use of water power either directly or through electricity. In fact, even now water rights are being rapidly acquired and developed on every hand, as the advance guard of the change that is to come. A sample of what a storage reservoir will do can be seen in the case of the comparatively small irrigation project at Minidoka, Idaho, which will develop about 30,000 horse power per year. Renting this power at the very low figure of $10 per horse power per year would pay for the entire Minidoka project, reservoir, irrigation-canals, gates and all, in six years. The amount of power generated by the Mississippi system is variously estimated high and low, with 60,000,000 horse power per year as an intermediate figure. Much of this amount is not directly available, but granting on a conservative basis that a series of impounding reservoirs would develop immediately 2 per cent. of that amount, there would be 1,200,000 horse power to be turned into electricity and distributed to factories. A purely nominal rental would be ample enough to repay in two or three decades the entire original expense of the system, besides a good income on the investment. The reservoir system, however, must be intimately associated with forest conservation as a vital factor in regulating surface drainage and especially in checking the amount of soil erosion which supplies sediment to the river.

The proper building of reservoirs in the headwaters, therefore, offers what no other plan can possibly offer: it promises effective regulation of river stages and water supply for all time to come, removing entirely the liability of destructive floods, checking the erosion of banks and preventing much of the formation and shifting of sand bars and the pollution of water which the presence of sediment means. At the same time it provides a way of actually paying for itself in short order, aside from all idea of the savings to shippers and river interests in general which would be in excess of the cost. The importance of this latter consideration is emphasized best by a brief comparison with the system now being followed. The levee-revetment system, as mapped out, calls for an expenditure of $60,000,000 for its completion. From the engineers themselves comes the statement that the average life of a levee is not over twenty years, which means this and no more: in two score years, at the most liberal estimate, the present system, completed, will have disappeared entirely and a new series of levees constructed at the cost of another $60,000,000 will have taken its place, with conditions then no better than they are now. Considered solely on their own merits from the standpoint of control afforded, the present system has nothing, and the reservoir plan has everything, to recommend it.

In order to bring the river route to its highest possible degree of efficiency, it would be necessary to combine the reservoir system with a straightened course for the lower river, by which combination every evil would be removed and absolute control for all time would be insured. The reservoirs would make it possible to regulate the flow of the streams, preventing both floods and very low water, and at the same time, through developed horse power, pay for the improvements. The corrected or straightened course would shorten the route and effectively put an end to caving of the banks with all the difficulties arising from it at present. Together the reservoirs, with the necessary forest conservation and corrected course, would remove the sand bar problem—the one greatly lessening the actual amount of sand carried into the river, the other giving the current increased power to sweep its own channel clean.

It is undeniable that this plan calls for a large expenditure for its completion, but in the long run so does the levee-revetment system, without anything tangible to show for the outlay in the end. The whole question narrows itself down to a single issue: whether it is not better policy to do the right thing at the start, even if it require great initial outlay, rather than follow a plan which means the reconstruction of part of the so-called improvements every decade for centuries, with the region concerned always chafing under the handicap of a mediocre, inadequate waterway. The waste of money on levees and revetments ought to cease once for all. Let the federal government authorize the completion of the entire reservoir system with a straightened course for the lower river, and loose the bonds which every year are drawn tighter over this heart of our nation.

GEOGRAPHIC NEWS AND NOTES

Recent studies of the Po delta, according to the *Revista Geografica Italiana,* show a general advance of the line of the delta amounting to 70 or 80 meters yearly from 1893 to 1904.

A very interesting account of efforts to domesticate the African elephant for use in the Congo Free State is given in a special publication of the *Bulletin Officiel de L'Etat Indépendent du Congo.* Elephants are abundant in the marshy regions of the forests, but as yet there has been no success in domesticating any save young. These can be made to work at an age of seven or eight years and have already been used in such operations as ploughing, hauling carts or carrying loads. In the marshy districts of the Congo, and much of the country is marshy, the domestication of the elephant, if it can be continued satisfactorily, will aid very greatly in the development of the state.

It is reported that Professor Gerard de Geer, of the University of Stockholm, is to be sent by the Swedish government to Spitzbergen with a party to carry on geographical and geological explorations.

An interesting sidelight on Russian conditions is found in the proposal of the Russian Ministry to locate a northeast passage, to be available for naval communication between the western and eastern ends of the Empire.

Thirty stations in central and western Ireland reported black rain on October 8 and 9, 1907, according to *Symon's Meteorological Magazine.* The blackness was due to soot, which was deposited in such quantities that water tanks had to be emptied and cleaned. The cloud came from the southeast and apparently crossed the channel and the whole of Ireland.

The *New York Sun,* May 17, 1908, calls attention to the boldest and most successful feat of mountaineering in many a day: that of the Norwegians, Rubenson and Monrad-Aas, who late last year reached the summit crest of Kabru in the Himalayas. The details of their work have just appeared in the *Alpine Journal.*

They attained a height of 23,900 feet, the highest on record. W. H. Workman had held the record since 1903 with 23,394 feet, made far to the west in the Karakoram branch of the Himalayas. Graham claimed in 1883 to have reached 23,700 feet on Kabru, but the fact is disputed by most mountaineers.

After climbing to about 16,000 feet the Norwegians reached the actual foot of Kabru, on its southeast side. With a week's provisions and fourteen picked coolies they started on the ascent.

The ice and snow gave them little difficulty up to 19,500 feet and then came the perils of smooth ice on the steepest of slopes and of rock and ice avalanches from far above that test the mettle of the best men.

For five days they were cutting steps in the solid ice amid a chaos of ice needles and crevasses in a frozen world of the most fantastic forms. Every danger of climbing in the Alps and Caucasus is intensified in these upper reaches of the Himalayan summits, but the explorers have nothing but praise for their coolies, who proved after a short training in the use of the ice axe and rope to be keen and effective mountaineers.

Half way up this ice slope they found a flat bit of ground where they pitched camp and rested two days. They were now 21,500 feet above sea level.

The ice wall to their left, from 200 to 500 feet above them, frequently dropped huge ice blocks, and this danger required constant vigilance. Great banks of cloud usually barred the scene below them, though sometimes they caught views of Darjeeling, some fifty miles to the southwest.

They were two days making the next 500 feet of ascent, and at 22,000 feet all but the two best coolies were sent back to the lower camp. The four men in advance passed a miserable night huddled in their little tent with the temperature over 20 degrees below zero Fahrenheit.

On October 20 they started on the final attempt to reach the summit. The great cold was intensified by a high wind and progress was slow, for every step had to be cut in the frozen snow and often they had to stop to look after their feet, which threatened to freeze. They dropped their only watch early in the day and it went skimming down and over the precipices.

Upward they struggled until about 6 P. M. they think, when they reached a place which they thought was the top of Kabru. But here they found a ridge, perhaps less than 100 feet above them, which they are positive is the culminating summit of the mountain.

The sun had set, the task ahead of them was difficult and dangerous and they dared not go on. To spend the night at the summit would mean death, for the cold was almost unbearable and they must retreat at once to the camp below.

The moon soon rose and with its aid they made their way safely down, though not without one thrilling moment. Rubenson slipped on a very steep slope and flashed past his friend like a shot. Monrad-Aas threw himself flat to support the strain on the rope. He saved his comrade and himself, but four of the five strands of the Swiss tourist rope parted and Rubenson was held by a single strand.

Because it was a great achievement it is all the more to be regretted that impediments, chiefly the bitter cold of the last day, prevented these mountaineers from completing the ascent when they were so near their goal.

The difficulties of respiration at high altitudes have attended many mountain climbers and explorers, and the theory advanced in explanation has been that this trouble was caused by the reduced tension of the oxygen in the atmosphere. Professor Mosso, an Italian scientist, has recently disproved this theory by showing that if the pressure of the mixture of oxygen and nitrogen making up ordinary air be reduced to one third of an atmosphere, and then the proportion of oxygen be increased so that its partial pressure is the same as normal, the mixture is breathed with inconvenience, accompanied by an abnormal respiration and pulse. By taking supplies of pure oxygen and mixtures of gases to the summit of Monte Rosa and analyzing the blood it was shown, however, that a diminution in the amount of carbon dioxide in the air due to the low pressure was doubtless responsible for much of the trouble in respiration. Proof of this was afforded by breathing a mixture of 80 per cent. of oxygen and 20 per cent. of carbon dioxide on top of Monte Rosa, with a feeling of pleasure and ease, while the effect of the same mixture near the sea-level in Turin was to produce giddiness and vomiting. If this discovery is substantiated by further experiments it seems that by carrying cylinders containing this mixture of gases the highest mountain peaks can be scaled, while the mere provision of oxygen is of doubtful utility.

Professor William Morris Davis, Sturgis-Hooper Professor of Geology at Harvard University, has been selected by the German government as the visiting professor at the University of Berlin in 1909.

A summer meeting of the American Association for the Advancement of Science will be held at Dartmouth College in the latter part of June.

Professor J. B. Woodworth, of Harvard University, is leading the Shaler Memorial Expedition to Brazil.

ACTIVITIES OF THE SOCIETY

PANAMA AND THE SPANISH MAIN

ADDRESS BY

MRS. HARRIET CHALMERS ADAMS

March 25, 1908.

The northern countries of South America, so full of historical romance and scenic beauty, afforded a very interesting topic for Mrs. Adams' address. Several years of extensive travels in South American localities had sufficed to make the speaker intimately acquainted with these newly awakening old countries. In the course of the address the audience was introduced to the most attractive scenes of city and tropical jungle in our neighboring but little visited sister nations. Many exceptionally fine illustrations were used to supplement the speaker's remarks. A series of colored views showing the tropical sunset and moonrise as seen from on board vessel in the Caribbean were truly wonderful and formed a fitting climax to an exceedingly interesting meeting.

CLIMBS ON THE MEXICAN SNOW MOUNTAINS

ADDRESS BY

MR. CHARLES GILCHRIST

April 1, 1908.

Mr. Gilchirst, who has recently accomplished several difficult ascents among the peaks of Mexico, including the ascent of Ixtaccihuatl, gave a very vivd description of the difficulties and adventures encountered by the way. An account of the ascent of Ixtaccihuatl has already appeared in the BULLETIN. Many strikingly beautiful scenes among the snow-capped peaks were shown during the course of the address.

ACROSS THE HIMALAYAS TO THE UNEXPLORED DESERT OF LOP NOR

ADDRESS BY

DR. ELLSWORTH HUNTINGTON

May 6, 1908.

The society was truly fortunate in securing for the last meeting of the year, Dr. Ellsworth Huntington, to tell of his work in the exploration of

Central Asia. The full account of Dr. Huntington's explorations has been made available in popular form in his recent book, "The Pulse of Asia," while more scientific discussions are to be found in the reports published by the Carnegie Institution.

The personal touches of unusual experiences, told in a simple, off-hand manner, lent unusual charm to an address which was replete with interesting information of both scientific and popular nature. Dr. Huntington described the course of his journey from Kashmir, across the ranges of the high Himalayas, over snow-covered passes as high as 19,000 feet, on his way to the great interior desert lying to the north of the Tibetan plateau. It was in this desert, the Takla Makan, where most of his work was done, and especially in that portion which Dr. Huntington calls the Lop Basin. Having in mind the study of the effects of geographic conditions, and especially changes of climate on human life, he was able to correlate as cause and effect many highly suggestive observations. A journey which was not without its hardships and personal dangers bore fruitful results in the subject of what may be called human geography.

Dr. Huntington's address was an appropriate conclusion for one of the most successful series of meetings which the society has ever held.

INTERMONTHLY MEETINGS

The series of intermonthly meetings which was begun in February was continued through April, with the following topics and chairmen: "Mexico" —Miss Mary S. Holmes; "Japan"—Mr. Clarkson Clothier; and "Italy"— Miss Laura Bell. The success of these meetings is shown by the fact that the last bi-monthly meeting of the season on Wednesday evening, April 29, was held in Westminster Hall, the audiences having steadily increased necessitated using a larger room. The subject of the evening was Italy, and Miss Laura Bell was chairman, introducing as the first speaker, Mrs. J. Edwards Woodbridge, whose interesting talk about "Some Artistic Places in Italy" was fully illustrated with many beautiful slides, all of which pictures were taken by herself. Professor Thomas Nolan, of the University of Pennsylvania, then followed with an address on "Italian Architecture as affected or influenced by Geographical, Geological and Climatic Conditions." Many pictures were also shown by him, and the treatment of the subject was scientific and enjoyable. Professor George Walter Dawson, also of the University of Pennsylvania, then took his hearers wandering among the "Gardens of Italy," a fascinating study tour mid charming surroundings, one picturesque spot after another eliciting applause. This concluded the symposium, and the interest shown in these bi-monthly meetings bids fair for another season, when it is proposed to take up Europe as a whole.

ANNUAL RECEPTION

April 25, 1908.

The Board of Directors of the Geographical Society of Philadelphia held an informal reception in the library of the Society, 400 Witherspoon Building, on Saturday afternoon, April 25, from three until six o'clock. About one hundred members called during these hours and enjoyed the exhibition of rare and valuable Chinese curios and embroideries loaned for the occasion by Mr. C. Howard Colket, Mr. Samuel H. Austin and the Misses Bell. Tea and light refreshments were served by the committee of ladies dressed in Chinese costume.

PRIZES OFFERED

The Publication Committee announces the offering of two prizes of fifty dollars each for the best original contributions to geography. Information concerning the award of the prizes can be had by addressing the Publication Committee.

BOOK NOTES AND REVIEWS.

Davis, J. E. *Round About Jamestown.* Pp. 104. Published by the Author, Hampton, Va., 1907.

This small volume places in permanent form a series of interesting historical sketches of the Lower Virginia Peninsula, a series which originally appeared in the *Southern Workman.* The author deals chiefly with the early days and development of the region lying between the James and York rivers, conveying very attractive glimpses of this part of the country down to the time of the Civil War. The prominent place held by the peninsula in the stirring days of the war gave it much of historical interest and Miss Davis tells much about the places and objects reminiscent of those days. A number of decidedly good illustrations add charm to the volume.

Everly, L. L., Blount, R. E., and Walton, C. L. *Laboratory Lessons in Physical Geography.* American Book Co., New York, 1907.

This manual is the product of several years of experiment with laboratory exercises, in which time the exercises here given have been proved feasible. The manual includes in all ninety separate exercises, grouped as follows: Mathematical geography, eight; materials of the earth's crust, nine; drainage and land forms, thirty-one; the atmosphere, thirty-two; and the ocean, ten. Many schools would undoubtedly find their equipment inadequate for some of the exercises, but the additional apparatus likely to be needed would entail only moderate outlays—well within the range of any school.

The series is surprisingly complete and well selected to illustrate the important points of the subject. The form of the manual, perforated for the insertion of blank pages, and with numerous maps and cross-section sheets, add materially to its usefulness and adaptability to various needs.

It is a manual which can be heartily recommended to the teacher in secondary schools for which it was designed.

Maury-Simonds. *Physical Geography.* Pp. 347. American Book Co., New York, 1908.

This revision, or rewriting of Maury's Physical Geography, has been done by Professor F. W. Simonds, of the University of Texas, "to the end," as he states, that it "may maintain its position" through being brought down to date.

It is to be doubted whether this revision will have the desired result, since the outcome is a text which must be regarded as decidedly inferior to any one of a half dozen other modern texts, written originally to meet the demands of present day teaching methods.

The subject matter of the book is divided into five parts: The earth, the land, the water, the atmosphere, and life. On the face of it such a division is not undesirable, but an examination in detail will fail to reveal any logical reason for discussing volcanoes and earthquakes in connection with the astronomical relations of the earth; or the consideration of rivers under the water, and glaciers under the atmosphere. Such a treatment is far from meeting the standards of present day teaching methods.

The treatment of individual topics is in many cases so brief as to be almost valueless. This is due partly to an apparent desire to mention everything and partly to a lack of space, since much text has been sacrificed to make room for some two hundred illustrations. An explanation of the planetessimal hypothesis in eight lines is little short of a miracle in condensation. Six lines given to "plains as centers of civilization" and three lines to Australian drainage may be compared with a whole page to explain the mechanical construction of a barometer.

It is not a book which is likely to meet or justify a very wide demand in the lower schools for which it is evidently intended.

RECENT ACCESSIONS TO THE LIBRARY OF THE SOCIETY

AFRICA.

From the Niger to the Nile. By Boyd Alexander. New York: Longmans, Green & Co., 1907. 2 vols. Illustrations and Maps. *Presented by the Publishers. To be reviewed.*

AMERICA—SOUTH.

A Travers L'Amerique du Sud. By J. Delebecque. Paris: Plon-Nourrit & Co., 1907. Illustrations and Maps. *Presented by the Publishers. To be Reviewed.*

ASIA.

Narrative of an Expedition of an American Squadron to the China Seas and Japan performed in the years 1852, 1853, and 1854 under the command of Commodore M. C. Perry, U. S. Navy. Compiled from original notes and journals of Commodore Perry and his officers by Francis K. Hawks. Washington: Government Printer, 1856. 3 vols. *Presented by Mrs. Henry Haupt.*

In Korea with the Marquis Ito. By George Trumbull Ladd. New York: Charles Scribner's Sons, 1908. Illustrations. *Presented by the Author. To be Reviewed.*

EUROPE.

Picturesque Sweden. Published by the Swedish Touring Club. Stockholm: 1907.

OCEANICA AND THE POLAR REGIONS.

In the Land of Pearl and Gold. By Alexander Macdonald. Glasgow: Blackie & Sons, 1907. Illustrations. *Presented by the Publishers. To be Reviewed.*

REPORTS, PROCEEDINGS, ETC.

Report of the Maryland Geological Survey. Vol. 6, 1906. Baltimore: 1906.

Report of the Superintendent of the Coast and Geodetic Survey, 1907. Washington: 1907.

Report on the Progress and Condition of the United States National Museum for the year ending June 30th, 1907. Washington: 1907.

Svenska Turistforeningens Arsskrift, 1908. Stockholm: Swedish Touring Club.

MAPS.

Railway map of the Dominion of Canada, 1907. James White, Geographer. Ottawa, Department of the Interior. *Presented by James White.*

Toronto and Muskoka Sheet. James White, Geographer. Ottawa: Department of the Interior. *Presented by James White.*

General Chart of Alaska. Compiled from United States and Russian authorities. U. S. Coast and Geodetic Survey: 1896. 2 copies. *Presented by Mr. Henry G. Bryant.*

Map of the N. W. Coast of America and Inland Passages from Olympia, Washington, to Mt. St. Elias, Alaska. U. S. Coast and Geodetic Survey: 1893. *Presented by Mr. Henry G. Bryant.*

Map of the N. W. Coast of America, Dixon Entrance to Cape St. Elias. U. S. Coast and Geodetic Survey: 1897. *Presented by Mr. Henry G. Bryant.*

Map of the N. W. Coast of America, Icy Bay to Semidi Islands. U. S. Coast and Geodetic Survey: 1897. *Presented by Mr. Henry G. Bryant.*

Map of the United States, including Territories and Insular Possessions. *Presented by Mr. Alba. B. Johnson.*

Pilot Charts of the N. Atlantic Ocean for May, 1908.

Pilot Charts of the N. Pacific Ocean for May and June, 1908.

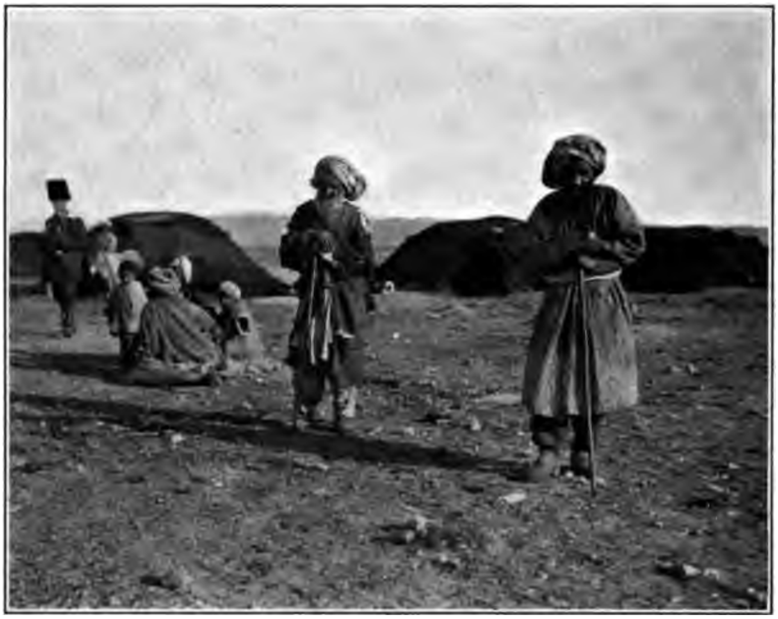

Fig. 1. Nomads on the Western Border of Afghanistan. The man on the left is a Russian officer.

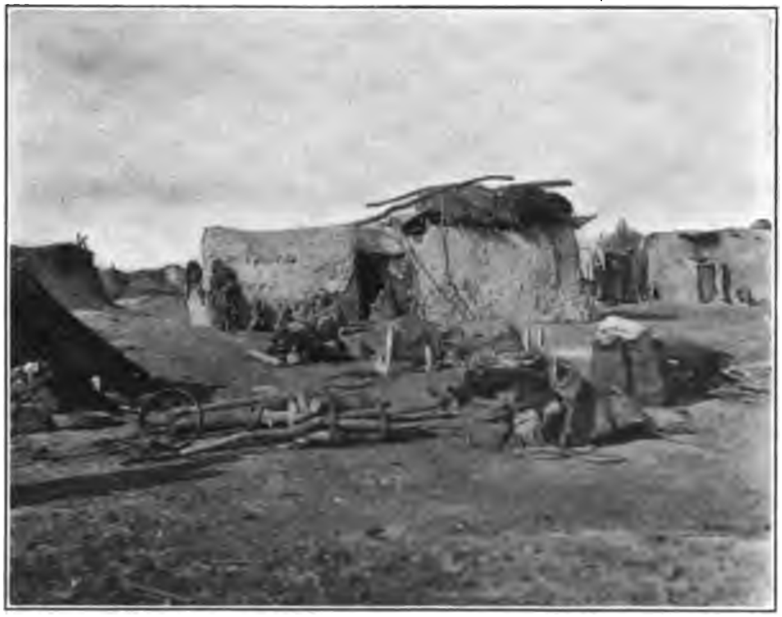

Fig. 2. A Village in Seyistan. The houses are made of tamarisk bushes wattled with clay.

THE RELATION OF AFGHANISTAN TO ITS NEIGHBORS.

ELLSWORTH HUNTINGTON.

The activity of the Afghans upon the northwestern frontier of India during the spring of 1908 calls attention once more to the peculiar relation which Afghanistan bears to both England and Russia. In itself Afghanistan has very little importance to the world at large. To be sure its area is greater than that of either France or Germany; but its population of between four and five million only equals that of our two states of Kentucky and Tennessee, and is not one-tenth that of Germany. Recent history has no record of any Afghan who has had a perceptible influence upon lands outside his own; and the foreign trade of the country is almost too small to be mentioned, although the Netherlands with a population only slightly larger have a total import and export trade of over a billion dollars a year. Nevertheless Afghanistan has played a prominent part in the history of Asia, and to-day the conduct of the Afghans is one of the most critical factors in determining the relation between England and Russia. Time after time Afghan princes have conquered northern India and Persia, and for many centuries Afghan dynasties have sat on the thrones of those countries. At present the natural lines of communication between Europe and India on the one hand, and between Russia and the Indian Ocean, on the other hand, lie through Afghanistan or along its borders. Therefore the preservation of British rule in India and the realization of Russia's aspirations for commercial development are both dependent on the political condition of the Afghans.

In order to understand the political relations of Afghanistan, it is necessary to have a clear conception of its geography. The country may be divided into regions of very varying size characterized by special topographic forms and hence by special modes of life. The north-central and eastern portion of Afghanistan consists of lofty mountains and plateaus. Around this on every side except the east, where the great highlands of northern India lie, there is a piedmont belt where the plateaus descend into low hills bordering great plains of gravel and silt brought down from the mountains. After the piedmont region is left behind, the plain becomes a vast sandy desert almost uninhabitable. The plain to the north of the central mountains forms the Russian province of Transcaspia; that to the south forms the Helmund Desert and is the third division of Afghanistan. The fourth and smallest division is the lacustrine basin of Seyistan in the southwestern corner. The corresponding basin far to the north is occupied by the Sea of Aral and the Russian protectorate of "lone Khiva in the waste."

The mountains and plateaus are the life and strength of Afghanistan. A great district some five hundred miles long and two hundred miles wide is nowhere less than 5,000 feet above the sea; in many places large areas lie at heights of eight or ten thousand feet, while the higher peaks rise to an elevation of 15,000 or even 20,000 feet. In such a region there is naturally much rain and snow; the temperature is low; agriculture can be carried on only in the more favored valleys; and in general the conditions of life are hard. Naturally the people are largely pastoral. Even where they live in permanent villages, they are in the habit of moving about with their flocks in summer. The higher mountain ranges divide the country into small isolated sections between which communication is not easy. Thus a tribal organization of society is fostered, and the highlands are full of hostile clans like those of northern Scotland a few centuries ago. Inasmuch as the tribesmen are usually poor as well as hardy, it is not surprising that they should look upon their more prosperous neighbors of the lowlands with envy. And since the men of the hills are nomads to whom rapid movement with or without their families is a matter of course, they have naturally developed the common mountaineers' tendency to become plunderers. Retaliation is impossible because the lowlanders are not competent to attack the highlanders in their mountain fastnesses, and because if they were thus competent, reprisals would be of little use since it is impossible to get at the tribesmen in order to kill them, and they have no property of any special value which can be destroyed to teach them a lesson. The recent raids of the Afghans upon northern India are merely the latest expression of the fact that the contrasted topographic nature of the Afghan highlands and of the plains of the Indus favors the development of a somewhat unpleasant, pugnacious type of character among the hillsmen, and of a type of political organization which makes it impossible for the nominal ruler to bind his subjects.

Among the Kaffirs, or Siakh Push, who live in the extreme northeast of Afghanistan a still more notable example of the effect of a mountainous environment is seen. They have been driven into the very wildest and most inaccessible parts of the mountains by invading Afghans, and have there developed the mountain character to its limit. Living where none but the hardiest can survive, they glory in enduring cold and hunger, and count it creditable to go around with one arm naked in bitter winter weather. All men except those of their own immediate valleys are enemies to them. No young man can take a wife until he has killed a certain number of the hated Mohammedans who drove his people into their fastnesses and now occupy most of the land.

In the piedmont region where the plateaus break down to the plains there is a region much pleasanter than the rugged highlands. Here, at an elevation of from 2,000 to 5,000 feet, fair valleys are filled with fruit trees and grain fields, or oases appear as patches of green surrounding the mud villages of prosperous farmers. Rain is not plentiful, and the hillsides are parched for much of the year, but the snowy highlands supply abundant water for irrigation. The chief wealth of the country and the majority of the inhabitants of Afghanistan are located in this region. Many of the farmers are also shepherds and move to the mountains at certain seasons. All the people are more or less warlike, although by no means equal to their upland neighbors. If they were not able to fight, they would soon be ousted, as they often are, by their more hardy compatriots of the highlands. Trade is somewhat developed in the piedmont region, and in it lie most of the important towns, Kandahar on the south, Herat on the west, and Mazar-i-Sherif on the north. Kabul on the east belongs properly to this same division of the country, although it is located at a rather high elevation among the mountains. Nevertheless it is one of the places where agriculture is the prevailing occupation and the people are sedentary in the strict sense of the word.

The desert plain which forms the southern part of Afghanistan is a dry, barren waste of gravel and sand. The few travellers who have crossed it describe it in terms of anything but approbation. Much of it is absolutely uninhabitable except for a short time when the spring rains cause a little herbage to flourish for a month or two. The few nomads who dwell in the more habitable portions near the streams are a poverty-stricken people, prone to plunder and theft because they have so little with which to support life.

The fourth division of Afghanistan consists merely of the delta of the Helmund River and a few other small areas on the shore of the lake or swamp of Seyistan. The entire population is concentrated into a comparatively small area. Most of the Seyistanis practise agriculture, although a few nomads come in from the desert at certain seasons. As the farmers of Seyistan do not have to travel about with flocks and as they are largely cut off from enemies by the surrounding desert they have little need of fighting, and are of a less warlike disposition than the rest of the Afghans. Their oasis, as Seyistan may properly be called, is not wholly under Afghan rule, for half of it belongs to Persia, an arrangement which defies all geographic principles, and has led to endless political squabbling.

Aside from the character of its people, there are few things which have so great an influence upon the political relations of a country as the nature of its boundaries. This is especially the case in a primitive state like Afghanistan where trade is as yet very little developed. The boundaries of the country are unsatisfactory. Instead of coinciding with natural lines of division, they often cut across them. On the east the boundary between Afghanistan and India is formed by the Suliman Mountains. These mountains rise steeply on the Indian side and are difficult of access from that direction. On the Afghan side, however, they partake of the character of a plateau rather than of a mountain range, and are much more easily accessible. On the Indian side they are almost uninhabited, on the Afghan side they contain a sparse population of warlike nomads. At their base in India prosperous agricultural communities are well provided with animals and other forms of wealth coveted by the poor Afghans across the border. If the Suliman Mountains were high enough or cold enough to be uninhabitable, or if they were in a part of the world where there was rain enough so that the lowlands on the Afghan side were more

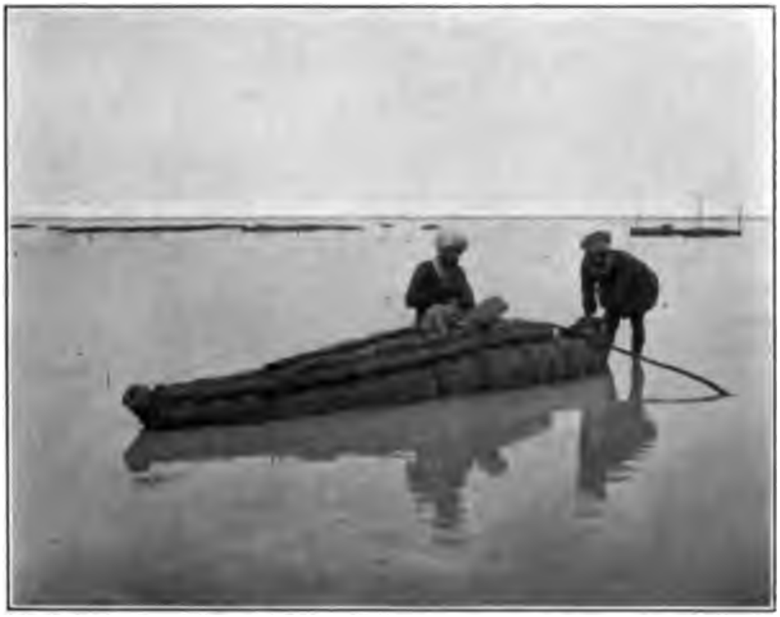

Fig. 3. A Raft of Reeds on the Lake of Seyistan.

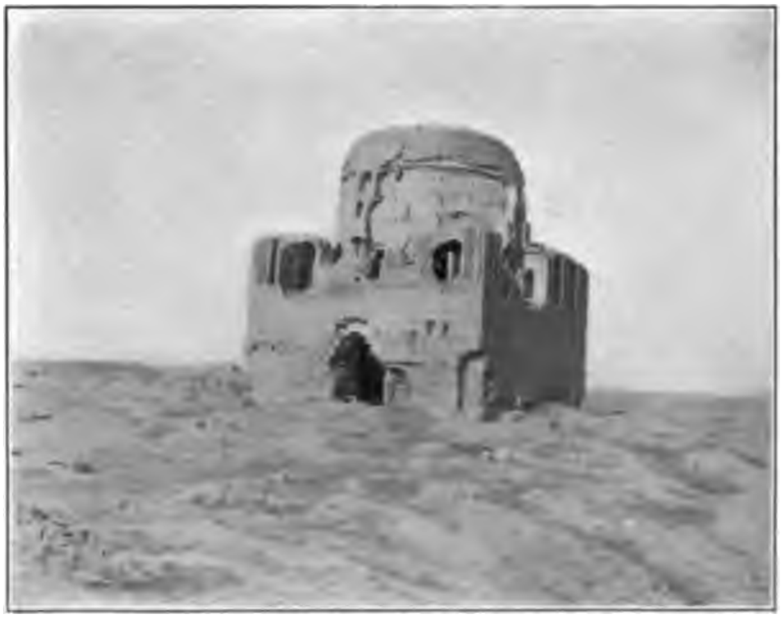

Fig. 4. A Ruined Mosque at Merv in Transcaspia.

habitable than the mountains, they would form an effectual barrier and would serve as a good international boundary. Under the present conditions of habitability they are a poor boundary, as England has found to her cost. Try as she will, it is almost impossible to keep the Afghans in order when they suffer from famine or when the desire to raid the lowlands takes hold upon them for any reason. Little by little England has had to push the frontier of India forward in self-defense to save the lowlanders from the highland Afghans. The present raids have a certain purely political bearing, perhaps, but back of that lies the geographic fact which will keep the border always in a state of chronic disorder unless some strong power takes the Afghan tribes in hand. England has given a pledge to Russia to refrain from interfering with Afghanistan internally, but she may have to interfere in spite of herself by reason of the compulsion of the inexorable facts of geography.

The northern boundary of Afghanistan is fairly effective so long as it follows the Oxus River. In its upper course the stream flows in a deep gorge among lofty mountains. The gorge is hard to cross; and there is little difficulty in preserving the frontier inviolable. The country on both sides is poor and is very difficult to traverse. The inhabitants on both the Russian and Afghan sides are ready to plunder if they have a chance, but there is nothing to tempt them to make raids upon one another. The raiders would be likely to suffer quite as much as the raided. Farther down stream the Oxus valley becomes wider, and the mountains on either side retire somewhat. The river is still a fairly effective boundary, however, so far as the prevention of disturbances along the border is concerned. The Russians defend it with a strong hand; and the people on the two sides are of nearly equal strength and wealth, and are in the main agricultural, so that there is little danger of raids like those upon the Indian frontier. The river is far from being an ideal boundary, however, in one very important respect, as will appear shortly. From the point where the northern frontier of Afghanistan leaves the Oxus it proceeds in a southwesterly and westerly direction for over 300 miles to the Heri Rud River. The line is here purely arbitrary, traversing first the plain west of the Oxus and then the foot-hills and low mountains of the upper drainage area of the Murghab, or river of Merv. It cuts directly across a region inhabited by people of a single race whom it places under two contrasted governments which pursue highly different policies. The result is that the Afghan Turkomans who inhabit the region are always ready to think that their own particular government is oppressing them unduly, and that they would be much happier under that which prevails across the border.

Russia, like England, has agreed to refrain from all interference with the internal affairs of Afghanistan. She has further agreed to carry on all diplomatic relations with that country through the English Foreign Office which exercises jurisdiction over Afghanistan in international affairs. Two things make it difficult for Russia to live up to her promises. In the first place the trade of the northern third of Afghanistan flows naturally to Russian Turkestan and the Central Asian railroad, just as that of the southern part flows naturally to India. It would be highly unnatural for the trade of either part of the country to cross the great mass of mountains in the center. Moreover a large number of laborers go from northern Afghanistan to Russian territory to get work. When the American archæological expedition sent out by the Carnegie Institution of Washington under the direction of Mr. Pumpelly was excavating at Merv many of the one hundred and fifty laborers employed were from Afghanistan. The Afghans go back and forth freely. If they get into trouble, as often happens, it involves dealings between the governments of Russia and the Amir of Afghanistan. The comparative ease with which the emigrants earn money in Russian territory and the degree of peace and justice which they enjoy there make them highly dissatisfied with their own corrupt rule; and they naturally desire closer relations with Russia.

Another reason why the northern boundary of Afghanistan is unsatisfactory from a geographic standpoint is found in its relation to the water supply of Transcaspia. In dry regions like the parts of central Asia under discussion the prosperity and even the life of the people depend directly upon the supply of water for irrigation. The large Transcaspian oases of Tejen, Merv, and Khiva, not to mention many smaller ones, derive their water from rivers which rise in Afghanistan. Part of the water is diverted before it crosses the frontier. In seasons of abundant rainfall this is not a source of difficulty. In dry years, however, the people who live up stream are apt to attempt to take more water than formerly or to take it in new places. Whether they do so or not, the people down stream are almost sure to think that they do. When the supply of water is small the most natural thing, in their view, is to suppose that someone has been drawing it off higher up stream. Thus very bitter feelings are engendered, and are likely to break out in violence at any time. The Russians are bound to look after the water supply of their subjects just as the British are bound to look after the protection of theirs from raids. The accomplishment of either end is very difficult without the infringement of the present arbitrary boundaries.

The southern boundary of Afghanistan may be dismissed briefly. Most of the way it traverses an utter desert. It is good because there are almost no people along it, it is difficult to cross, and there is nothing there which anyone wants.

The western boundary, that between Afghanistan and Persia, is good in parts and in parts extremely bad. It follows quite closely the line of what has been called the Afghan depression. On a good map it can be seen that along this line there are a number of peculiar features. The Heri Rud River breaks through the great chain of mountains which form the northern border of the plateau, or more properly basin of Iran, which comprises most of Persia, Afghanistan and Baluchistan. The mountains of Afghanistan do not quite match those of Persia, the ranges of the more western country lying about fifty miles north of the corresponding ranges of the eastern country. The Persian mountains rise abruptly in many places, forming an escarpment facing toward the east, while the Afghan ranges die out gradually, spreading out like great fingers and sinking little by little into a plain of gravel which stretches away for miles westward to the Persian escarpment. Here and there at the foot of the escarpment broad, flat hollows are occupied by salt lakes such as those of Nemeksar, Kulberenj, and Seyistan, lying largely in Persia, and God-i-Zirreh, and Mashkel, which lie in Baluchistan. All these things indicate that at a somewhat recent time, geologically speaking, there occurred a dislocation of the earth's crust whereby the country east of the line now followed by the western boundary of Afghanistan was depressed, while that to the west was elevated. Hence the break between the mountain systems of the two countries, the gap through which the Heri Rud was able to find a way out from Iran to the northern plains of Turan. Hence also the escarpment with deposits of gravel at its base alternating with hollows filled by lakes. The line of depression forms an excellent boundary in most places because the region is absolute desert. Along the Heri Rud it is only fairly effective, and where the fertile oasis of Seyistan is cut into halves the boundary is a mere makeshift. Seyistan properly belongs to Afghanistan, and in course of time it will probably be again united with the southern part of that country. The recent agreement between Russia and England giving to the one a northern and to the other a southern sphere of influence in Persia is a step toward this consummation. The English are fully alive to the evils of such a boundary, for they have had the thankless task of interfering several times when the two claimants to Seyistan contended too hotly.

The dislocation of the earth's crust which gave rise to the Afghan depression has had a marked influence upon human history and politics. From Constantinople on the west almost to the Pacific Ocean on the Chinese Coast, 5,000 miles away to the east, Asia is sharply divided into a southern and a northern half by vast systems of magnificent mountains. Nowhere along the whole of this great distance is it easy to cross the mountains except at the Afghan depression. There it is so easy that even in the present absence of roads a wagon could be driven across with no worse mishap than being tipped over a few times. It is probable that railroads will never cross most parts of the central mountain system of Asia. They may be built in western Persia or Turkey, perhaps, but only at great expense not only for construction, but for operation. If built they must of necessity follow winding courses and must climb up and down in a way that will make transportation expensive. At the Afghan depression, however, a railroad can cross the backbone of the continent with practically no engineering difficulties. It need not rise to an elevation of over 2,000 feet if it follow the Heri Rud. Farther south it would have to rise to about 3,000 feet in crossing the low mountains of southern Baluchistan before it could gain the coast. On the direct line to India the Suliman Mountains present greater difficulties, but these have already been surmounted by three lines of rail.

Centuries ago Alexander, Jenghis Khan and other eastern conquerors passed through the Afghan depression on the way between Iran and Turan. To-day Russia sees in it the easiest, safest and shortest outlet to the Indian Ocean. On the north a cold climate

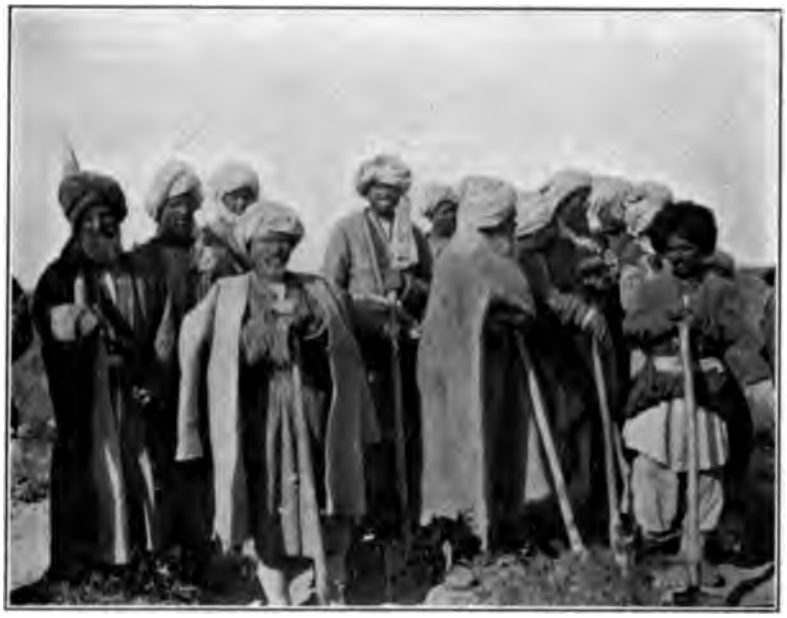

FIG. 5. A GROUP OF AFGHAN LABORERS. The man in a sheepskin cap is a Turkoman.

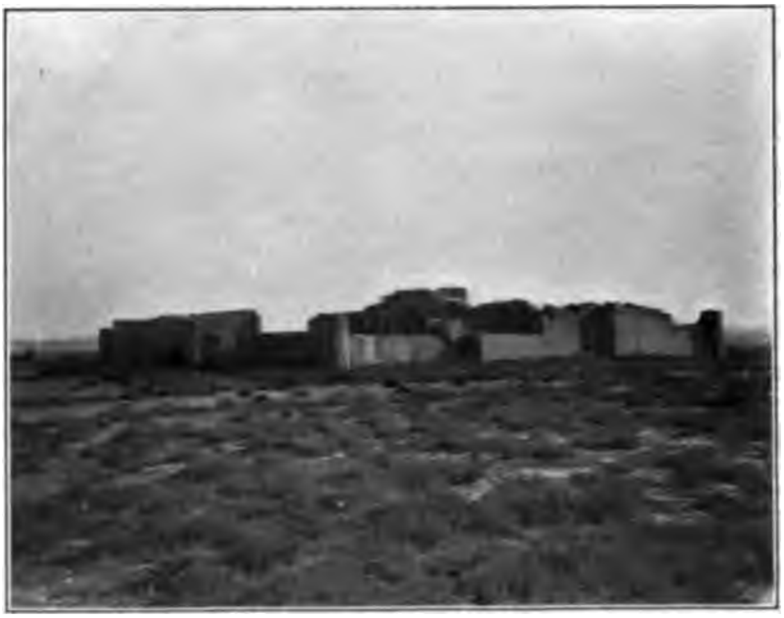

FIG. 6. THE FORT OF KAFIR KALA ON THE WESTERN FRONTIER OF AFGHANISTAN.

prevents her from using the magnificent harbors on the Arctic coast. The Baltic Sea is closed for half the year and its mouth is held by rival nations striving to outbid Russia in the world's markets. Far to the east the Siberian ports on the Pacific are also long closed with ice and are far from the center of Russian population. Three and only three possible outlets are available to the growing commerce of Russia. One is Constantinople and the Bosphorus; but all Europe blocks her there. A second is Manchuria and the China Sea; but Japan with the advice and consent of the rest of the world has dashed her hopes in that quarter. The third outlet is through the Afghan depression; but there England has checked her for the present. The route from the Caspian Sea to the Persian Gulf offers a possible fourth outlet, but it is so beset by mountains that it can never compete with the Afghan line.

Although the game of politics may interfere with what would be expected from geographical premises, it seems as if within a comparatively short time the Afghan depression must become one of the great routes of world travel. The English railhead on the southern frontier of Afghanistan at New Chaman near Kandahar is only five hundred miles from the Russian railhead on the opposite frontier at Kushka near Herat. Throughout the whole distance between the two there are no obstacles to railway construction. Far and away the best line from Europe to India lies along this route. Some day the line must be built. Afghanistan, to-day an unknown, hermit land, will then be in the midst of the world's activities. Therefore the control of the country is of vital importance to all concerned. Nature has made the land of such a temper that its people are prone to independence. She has also put in it a break in the earth's crust which makes two of the greatest nations in the world extremely anxious to curtail that independence.

THE CONSERVATION MOVEMENT.

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The movement for the conservation of the natural resources of the United States is of prime concern to all patriotic Americans; but to the geographer the subject appeals with double force. His knowledge of the earth and its resources gives him a scientific appreciation of the grave consequences of abusing and wasting, instead of using so as to preserve as carefully as possible, the nation's heritage of natural wealth; and, as one who travels much, the geographer regards the earth not merely as the storehouse of material wealth, but also as the source of many of the higher pleasures of life.

The geographer realizes that our country will lose its beauty and charm as well as its utility if its forests are destroyed, its soil robbed of its fertility by leaching and erosion, and its streams, through alternating flood and desiccation, become a recurring menace to life and property. Thus for reasons immaterial and æsthetic as well as economic and social the geographer will follow closely, and gladly further, the movement now being organized to minimize the waste of our useful minerals, to perpetuate and restore our forests, to give perennial and ever growing fertility to our farms, and to regulate our many streams so that they shall enlarge the areas of irrigation, shall bear more largely the burden of commerce, shall give their neighboring cities pure water and cease to carry destructive floods over their fertile valleys.

This movement is much older than the present agitation. For nearly two decades the United States Department of Agriculture has been supplementing the states in instructing farmers regarding soil elements, crop rotation and methods of tillage. The Bureau of Forestry in this department of the federal government has for a decade been doing most effective work administering the reservations wisely withdrawn from sale by President Cleveland and his successors. Meanwhile, several states, notably New York and Pennsylvania, have set aside and acquired large forest tracts, and provided for their administration. The national and state geological surveys and the Engineer Corps of the United States Army have each in its way done much to educate the public as to the extent, the limitations, the use and abuse of the country's mineral and fluvial resources. The people of the United States would know comparatively little regarding the extent of their mineral resources and the rapidity with which nature's supply is being destroyed were it not for the surveys and carefully prepared reports made by the Geological Survey of the federal government and the more progressive states. Likewise, the annual reports of the Chief Engineer of the United States Army give detailed information in regard to the condition of our rivers and their present and possible uses for navigation and for power.

One of the most effective agencies active at the present time is the United States Reclamation Service, created by the Newlands act of June 17, 1902. The projects now being carried out will, within a few years, add over one and a half million acres to the cultivable land of the arid West; while other projects which will in time be executed will increase the total by 3,780,000 acres. Thus within a comparatively few years over 5,000,000 acres of highly fertile land will be added to the productive area of American farms.

During the past ten years the sentiment in favor of the conservation and wise use of our natural resources has received strong impetus from numerous national organizations, such as the National Irrigation Congress, the National Drainage Congress, the National Rivers and Harbors Congress; and also by other associations interested in the improvement of the waterways in particular sections of the country, such as the Western Waterways Association, the Upper Mississippi Improvement Association, the Interstate Mississippi River Levee Association, the Lakes-to-the-Gulf Deep Waterway Association, the Missouri Valley River Improvement Association, the Ohio Valley Improvement Association, the Interstate Inland Waterways Association, the Columbia River Association, the Lake Carriers' Association, the Atlantic Deeper Waterways Association, and several other similar organizations. Their annual conventions, their published literature, and the continued agitation carried on by these societies are rapidly bringing about a public sentiment in favor of systematic effort on the part of the federal and state governments to prevent the unnecessary destruction of the natural resources of the country.

During the past eighteen months President Roosevelt has exerted his great influence in focusing public attention upon the conservation movement. His appointment in the spring of last year of the Inland Waterways Commission, a purely executive commission created without act of Congress for the purpose of furnishing the President with the information required by him to make intelligent recommendations to Congress, illustrated what could be done by the federal executive without congressional appropriation. The trip of the President down the Mississippi River ending with his memorable address at Memphis, October 4, 1907, did almost as much to awaken public interest in the improvement of waterways as did the voyage of the *Oregon* from the Pacific coast around Cape Horn at the opening of the Spanish War to influence the American people in favor of an early construction of the Isthmian Canal. At the time of the President's trip down the Mississippi River the suggestion was made to him by Mr. Gifford Pinchot, Chief Forester of the United States, that he call the governors of the states together in conference at the White House. The suggestion met with the hearty approval of the President and the conference was held on the thirteenth, fourteenth, and fifteenth of May of this year.

The conference was called together and presided over by the President of the United States, who had as his guests in the historic East Room of the White House forty-two governors of the states, each attended by three advisers.[1] Among the invited guests were the officers of seventy prominent national organizations, and there were numerous private individuals of prominence invited, the entire assemblage comprising 400 or 500 persons. The opening session was attended by the President, the Vice-President, the Supreme Court, the Cabinet and numerous senators and representatives. In many ways the conference was one of the most notable gatherings ever called together in this country.

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[1] One of the advisers selected by Governor Stuart of Pennsylvania was the President of the Geographical Society of Philadelphia.

With the assistance of Dr. W J McGee, secretary of the Inland Waterways Commission, a program was arranged to guide the deliberations of the conference. There has been no previous discussion of the resources of the United States comparable with the deliberations of the White House Conference. Students of economic geography of the United States will find a large amount of information contained in the papers read at this meeting.[3] The following condensed program shows what topics were considered and by whom they were discussed:

May 13. "Conservation as a National Duty." The President.
"The Conservation of Ores and Related Minerals." Andrew Carnegie.
"The Waste of Our Fuel Resources." Dr. I. C. White.
May 14. "The Natural Wealth of the Land and its Conservation." James J. Hill.
"Soil Wastage." Prof. T. C. Chamberlin.
"Forest Conservation." R. A. Long.
"Resources Related to Irrigation." Hon. George C. Pardee, ex-Governor of California.
"Grazing and Stock Raising." Hon. H. A. Jastro.
May 15. "Conservation of Life and Health by Improved Water Supply." Dr. George M. Kober.
"Navigation Resources of American Waterways." Emory R. Johnson.
"Conservation of Power Resources." H. S. Putnam.

President Roosevelt opened the conference with an exceptionally able address in which he emphasized the necessity of conserving our natural resources and using them with minimum wastage. The following paragraphs will illustrate the line of reasoning followed in his address:

"This nation began with the belief that its landed possessions were illimitable and capable of supporting all the people who might care to make our country their home; but already the limit of unsettled land is in sight, and indeed but little land fitted for agriculture now remains unoccupied save what can be reclaimed by irrigation and drainage. We began with an unapproached heritage of forests; more than half of the timber is gone. We began with coal fields more extensive than those of any other nation and with iron ores regarded as inexhaustible, and many experts now declare that the end of both iron and coal is in sight. . . .

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[3] Congress has provided for the publication of 100,000 copies of the proceedings of the conference. The volume can doubtless be obtained upon application to the National Conservation Commission, Washington, D. C., or to a senator or member of the House of Representatives.

"The natural resources I have enumerated can be divided into two sharply distinguished classes accordingly as they are or are not capable of renewal. Mines if used must necessarily be exhausted. The minerals do not and cannot renew themselves. Therefore in dealing with the coal, the oil, the gas, the iron, the metals generally, all that we can do is to try to see that they are wisely used. The exhaustion is certain to come in time.

"The second class of resources consists of those which cannot only be used in such manner as to leave them undiminished for our children, but can actually be improved by wise use. The soil, the forests, the waterways come in this category."

Only brief reference can be made in this paper to but a few of the other contributions made at the Conference. In discussing the Conservation of Ores and Related Minerals, Mr. Carnegie stated that

"Coal consumption is increasing at an astonishing rate. During the period for which statistics have been gathered, it has doubled during each decade; of late it has more than doubled. In 1907 the production was about 450,000,000 tons, or over five tons per capita for our entire population. At the present rate of increase the production in 1917 will be 900,000,000 tons; in 1927, 1,800,000,000 tons, and in 1937 over 3,500,000,000 tons, or an amount in that year alone nearly equal to the production of the seventy-five years ending in 1895; and with continuation of the wasteful methods of mining, the consumption and destruction together during that one year would equal our total useful production up to the present date. And at that time—which many of us will live to see—more than an eighth of our estimated original supply will have been consumed or destroyed.

"The total production of iron ore in the United States up to 1890 was some 275,000,000 tons; in the next ten years it was nearly 200,000,000; and in the seven years from 1901 to 1907 over 270,000,000 tons were produced, or very nearly as much as the total for the first century of our history. The aggregate production to date, 750,000,000 tons, is about one-thirteenth of the estimated original supply. At the recent rate of increase (doubling each decade) the production in 1918 will exceed 100,000,000 tons; by 1928, 200,000,000 tons; and by 1938 it will be over 400,000,000 tons, *i. e.,* in that single year, which many of us may expect to see, an amount approximating the entire production in the United States during the last century. By that date about half of the original supply will be gone, and only the lower grades of ore will remain; and all the ore now deemed workable will be used long before the end of the present century."

None of the papers presented at the Conference made a stronger impression than did the one read by President James J. Hill of the Great Northern Railroad. He devoted most of his attention to the wasteful use of our soil, and showed that the fertility of American farms was rapidly declining. This fact was brought out in several ways, one statement being that

"The average yield of wheat per acre in New York for the last ten years was about 18 bushels. For the first five years of that ten-year period it was 18.4 bushels, and for the last five, 17.4 bushels. In the farther West, Kansas takes high rank as a wheat producer. Its average yield per acre for the last ten years was 14.6 bushels. For the first five of those years it was 15.14 and for the last five 13.18. Up in the Northwest, Minnesota wheat has made a name all over the world. Her average yield per acre for the same ten years was 12.96 bushels. For the first five years it was 13.12 bushels, and for the last five, 12.8. We perceive here the working of a uniform law, independent of location, soil or climate. It is the law of a diminishing return due to soil destruction. Apply this to the country at large and it reduces agriculture to the condition of a bank whose depositors are steadily drawing out more money than they put in."

Professor Thomas C. Chamberlin, of the University of Chicago, in a paper of high scientific value, presented facts as to the rate of soil wastage, and indicated the methods by which soil wastage could be checked or prevented. His paper should be given wide publicity and ought to be largely influential.

Among the papers of exceptional merit was that prepared by Dr. George M. Kober, of Georgetown University, Washington, D. C., who discussed the Conservation of Life and Health by Improved Water Supply. The paper contains a mine of information regarding the relation of disease to the water used by different communities. The facts presented by Dr. Kober showed the urgent need of the government's taking immediate steps to prevent the contamination of all sources of drinking water.

The author of this article submitted a paper on the Navigation Resources of American Waterways, and his discussion of the subject led to the following conclusions:

" 1. That the internal commerce of the United States is growing rapidly and is certain to increase with accelerating speed. The demands for transportation facilities are expanding so swiftly as to make it necessary for the United States to improve the larger trunk line water routes of the country and adapt them fully to the needs of commerce.

" 2. The necessity for the development of our waterways is emphasized by the fact that any considerable future reductions in the costs of rail transportation are improbable.

" 3. The economy of employing both railroads and waterways for the performance of the transportation services becomes greater in every country and in particular sections of a country with the increase in population and the development and specialization of industry.

" 4. American waterways will, in the years to come, be utilized more for navigation, because we are certain, sooner or later, to conserve and use the entire water resources of the country simultaneously not only for navigation, but also for irrigation, for water power and for supplying our urban populations with pure water. Moreover, the growing necessity for controlling our streams so as to make possible the reclamation of our vast areas of reclaimable lands will tend to hasten the time when our principal waterways will be so regulated as to be serviceable for navigation."

The concluding paper on the program of the Conference was by Mr. H. St. Clair Putnam upon "Conservation of Power Resources." The growing importance of the subject is clearly indicated by the following statement taken from Mr. Putnam's paper:

" It is probable that the water power in the United States exceeds 30,000,000 horse power, and under certain assumptions as to storage reservoirs this amount can be increased to 150,000,000 horse power or possibly more. Much depends upon whether regulation reservoirs and reserve steam plants are included in the estimate. Both have been demonstrated to be practicable and undoubtedly should be considered in any estimate made of the available water power resources of the country.

"Using the smaller figure of 30,000,000 horse power as an illustration, to develop an equal amount of energy in our most modern steam-electric plants, would require the burning of nearly 225,000,000 tons of coal per annum, and in the average steam engine plant, as now existing, more than 650,000,000 tons of coal, or 50 per cent. in excess of the total coal production of the country in 1906. At an average price of $3.00 per ton it would require the consumption of coal costing $2,000,000,000 to produce an equivalent power in steam plants of the present general type.

"On the basis of the lower estimate of water power already mentioned, namely, 30,000,000 horse power, and applying the ratio which now exists between wages paid and power utilized in manufacturing and railroad industries the development of this amount of water power implies an increase in wages paid amounting to about $15,000,000,000 per annum—an amount more than double the total value of our agricultural products at the present time."

The papers briefly summarized in the foregoing paragraphs have been reproduced in whole or in part in all sections of the country and have undoubtedly been of far reaching influence. The first and most tangible result of the conference was the action of the governors of several states in appointing, or recommending their legislatures to provide for the creation of forestry and other commissions to aid in conserving natural resources.

While the conference was in session at the White House in May the President announced that it was his intention to continue the Inland Waterways Commission. Further consideration of the subject, however, caused him greatly to enlarge his plans and to establish a more comprehensive body (the National Conservation Commission) whose duty it should be to investigate and report upon the present condition and possibilities of conserving all the natural resources of the country, not only those of our waterways, but those of the forests, the land and the mines. The commission as a whole consists of forty-nine members with Mr. Gifford Pinchot, United States Forester, as chairman. The general body has an executive committee of nine members, and the work of the commission as a whole is divided among four committees or commissions of about equal size, one each upon waterways, forests, lands, and minerals. The President directed the various departments and bureaus of the United States Government whose work might be of assistance to the National Conservation Commission, to give that body such assistance as it might desire in the collection and collation of material; and he designated Mr. Henry Gannett, the Geographer of the United States Geological Survey, to direct the compilation, arrangement and presentation of the data secured for the Conservation Commission from the various departments and bureaus of the federal government. The material thus being collected will be presented to the Commission in December, and that body will then make an appropriate recommendation to the President for transmission to the Congress. Whether these recommendations do or do not bring immediate legislation they cannot fail to be largely influential in furthering the conservation movement.

There are numerous indications that the American people will not long postpone the adoption of systematic and comprehensive measures for the protection and preservation of the country's natural resources. Every step towards this end taken by the President has received enthusiastic public support. Possibly there is no better index of the general public sentiment upon this question than is to be found in the statements contained in the national platforms of the two great political parties. The plank adopted by the Republican convention in Chicago was as follows:

"We indorse the movement inaugurated by the administration for the conservation of natural resources; we approve all measures to prevent the waste of timber; we commend the work now going on for the reclamation of arid lands and reaffirm the Republican policy of the free distribution of the available areas of the public domain to the landless settler. No obligation of the future is more insistent, and none will result in greater blessings to posterity. In line with this splendid undertaking is the further duty, equally imperative, to enter upon a systematic improvement, upon a large and comprehensive plan, just to all portions of the country, of the waterways, harbors and Great Lakes, whose natural adaptability to the increasing traffic of the land is one of the greatest gifts of a benign Providence."

The Democratic convention in Denver adopted the following resolution:

" Water furnishes the cheapest means of transportation, and the National Government, having control of the navigable waters, should improve them to their fullest capacity. We earnestly favor the immediate adoption of a liberal and comprehensive plan for improving every water course in the Union which is justified by the needs of commerce, and, to secure that end, we favor, when practicable, the connection of the Great Lakes with the navigable rivers and with the Gulf through the Mississippi River, and the navigable rivers with each other, and the rivers, bays, and sounds of our coasts with each other by artificial canals, with a view to perfecting a system of inland waterways to be navigated by vessels of standard draught.

" We favor the coördination of the various services of the Government connected with waterways in one service, for the purpose of aiding in the completion of such system of inland waterways; and we favor the creation of a fund ample for continuous work, which shall be conducted under the direction of a commission of experts, to be authorized by law."

While the planks of political platforms are seldom promptly enacted into laws (and, generally speaking, this is most fortunate) it is probable that such legislation as the situation seems to require, and as the public funds permit, will be adopted by the Congress and the State Legislatures when, as is now the case, both of the great political parties are united in support of an economic program so unquestionably national in character as the conservation of our natural resources.

GEOGRAPHIC NEWS AND NOTES

Students of desert conditions and engineers will be interested in the report on the Turko-Egyptian boundary recently published by the Survey Department of Egypt, especially in the difficulties arising from the typical desert dust haze, the unsteadiness of objects seen across the heated surface, and distortion by mirage. The report gives a detailed account of how these special conditions affected the work and the means by which they were overcome.

The announcement in President Hadley's annual report relative to the plans for the geography department at Yale indicates a tendency to give the subject of geography a position similar to what it holds in European universities. The development of a series of courses in regional geography conducted by men who are recognized authorities on the geography of each of the continents is a step which might well be copied by other universities in this country.

The Association of American Geographers will hold their annual meeting in Baltimore in affiliation with the American Association for the Advancement of Science.

Once more the figures of an estimated population have been proved to be greatly exaggerated. This time it is the French Colonial office which from its recent census gives the total population of French Congo and the territories of the Chad as only 3,650,000 instead of 7,000,000 to 8,000,000 as was formerly supposed.

The recent disastrous floods in the South have amply justified the position taken by the National Academy of Sciences in urging the necessity of forest reserves in the Southern Appalachians.

The many tourists who have made the famous "Round the Circle" trip in Colorado and included a visit to the cliff dwellings of Mesa Verde, will be interested to know that all the rooms and plazas of the Palace are to be excavated to their floors, the walls repaired where necessary for safety, debris removed, and the whole made readily accessible: Dr. J. Walter Fewkes is in charge of the work of excavating and preserving these excellent examples of cliff dwellings.

The *Scottish Geographical Magazine* (Aug.) contains a very interesting account of the water conservation and irrigation schemes in the Murrumbidgee river distinct of Australia; it is written by the Hon. J. P. Thomson, Secretary of the Royal Geographical Society of Australia. In a country essentially agricultural and pastoral and subject to frequently recurring droughts which threaten the extinction of these industries, water conservation is of the utmost necessity. The future of the commonwealth, the author declares, depends largely on the attitude toward this question of water conservation.

With its September number the publication formerly issued under the title *Forestry and Irrigation*, changes its name to *Conservation*. It still remains the official organ of the American Forestry Association, the change being made partly because it is believed that under the new name the magazine will have a wider appeal and find a more sympathetic audience in a larger field of usefulness, and partly because the magazine has come to stand for more than merely forestry and irrigation. Its interest is in the preaching of conservation of all natural resources, and in its new field it should prove an important factor in this great movement. Much valuable geographical material is to be found in the pages of almost every issue.

The ninth International Geographical Congress was held at Geneva, July 26 to August 6, with some 750 members enrolled from the different nations of the world, and according to current reports was a success in every way. Among the more important results of the Congress were further action on the proposal for a map of the world on the scale of 1 to 1,000,000, the adoption of a proposal to form an International Cartographic Association for the publication of maps showing the progress of exploration in each country, and a resolution for the formation of an International Bureau to disseminate commercial information about new countries. Rome was selected as the place set for the next Congress to be held in 1911, at the time Italy celebrates its half century of independence.

The thirty-fifth Bulletin of the Bureau of American Ethnology by Walter Hough, contains a great amount of interesting material concerning the antiquities of the Upper Gila and Salt River valleys. Abundant remains of cliff dwellings, pueblos, and cemeteries prove that the region was once thickly populated by hunting and pastoral tribes. Many evidences point to the conclusion that they reached a high degree of culture and were able to carry on important works, such as the great irrigation dam in the Animas valley, New Mexico, an earthwork over five miles long and some twenty or more feet high. The time of, or reason for their disappearance is not known, and little has as yet been determined concerning their language and history.

Torrential streams present many difficulties in their control, not the least of which is the question of bridge maintenance. In the western part of the United States especially many streams, practically dry most of the year, are subject to sudden and very destructive freshets during certain seasons. Washouts and bridge losses have therefore been common because of the failure of the earlier bridge makers to meet the special needs of the case. In an interesting article in *Cassier's Magazine* (Sept.) Mr. H. A. Crofts describes the way in which modern bridge building has overcome this difficulty arising from local geographic conditions.

The Manchester Ship Canal, after four years of work, has been dredged to a depth of 28 feet so that now the largest freight steamers can reach the city without the necessity of any lightening of cargo.

The *Review of Reviews* (Aug.) summaries from the *Nuova Antologia* (Rome) a very interesting article about the reclaiming of Lake Fucino, which was projected by Julius Cæsar, but was not completed until 1876. Where originally 200 fishermen found a scanty living in the lake, over 12,000 inhabitants take rich crops from the 7,000 acres of fertile soil. Five hundred and fifty million bushels of grain are raised each year off this ground so long lost to the country. The magnitude of the project makes a striking comparison with modern undertakings in this country.

It is reported from Lima, Peru, that Miss Annie Peck, the well-known mountain climber, succeeded on her second attempt to reach the summit of Mount Huascaran. The first attempt was a failure because of a serious injury to one of the guides accompanying Miss Peck, necessitating their return. The second venture, however, was successful, Miss Peck reporting that she reached the summit, the altitude of which is placed by the reports at 25,000 to 26,000 feet. These figures, however, are subject to very much doubt, since most of the available authorities give the altitude of Huascaran indefinitely, as "upwards of 20,000 feet," while some even question the fact of its reaching 20,000 feet.

ACTIVITIES OF THE SOCIETY

COMMITTEES APPOINTED.

The following committees have been appointed to serve during the ensuing year.

Excursion Committee.—Miss Mary S. Holmes, Chairman, Amos Bonsall, J. E. Burnett Buckenham, Miss Laura Craven, Prof. John W. Harshberger.

Entertainment Committee.—Harold Peirce, Chairman, Mrs. Charles Roberts, Miss Mary S. Vaux, Clarkson Clothier.

Finance Committee.—Edward I. H. Howell, Chairman, Clarkson Clothier, Benjamin R. Hoffman.

Library Committee.—Benjamin R. Hoffman, Chairman, Harold Peirce, Dr. Paul J. Sartain.

Membership Committee.—Clarkson Clothier, Chairman, Thomas R. Hill, Prof. Emory R. Johnson.

Publication Committee.—Prof. Emory R. Johnson, Chairman, F. Norman Dixon, Thomas R. Hill, Miss Mary S. Holmes, William A. Shryock.

Reception Committee.—Miss Elizabeth E. Massey, Chairman, Miss Mary Blakiston, Mrs. J. Howard Gaskill, Mrs. William S. Hallowell, Mrs. Theodore Le Boutillier.

The Excursion Committee are planning two autumn trips for the members of the Society and their friends. The first one, on October 17, is to be a half day tramp, taken in easy stages, and covering, in part, some of the picturesque and historic portions of Crum Creek Valley. The second trip, on October 24, will take the form of a coaching party along the old Lancaster Pike, with its multitude of associations and ever varying scenery.

These outdoor gatherings of the Society have come to be regarded as one of the most delightful of all our activities; the increasing numbers are ample evidence of this fact. By making this preliminary announcement the committee hope to make the parties larger still.

BOOK NOTES AND REVIEWS

Dann, E. W. *Historical Geography on a Regional Basis.* Vol. I. The British Isles. Pp. 182. J. N. Dent & Co., London, 1908.

This is the first volume of a work which when completed in other volumes, will cover the whole of Europe. It is divided into twelve chapters, the first two of which are introductory, the third outlines the regional geography of the British Isles, while the remaining chapters are given over to the discussion of migrations, or really routes of immigration, special sections of the Isles, political divisions, sea power, historic towns and a concluding chapter on Greater Britain.

The book is suggestive in its treatment and evidently the result of much care and thought in the preparation. Its chief weaknesses are that it presumes a rather startling degree of familiarity with the history of British territory, and also that the everyday side of life is not considered fully enough. History to-day is steadily drifting away from the "chronicle of wars" stage, and the influence of geography on the peaceful events of life is now a more valuable study if not more interesting.

Dann, E. W. *Historical Geography on a Regional Basis.* Vol. II. Europe. Pp. 215. J. N. Dent & Co., London, 1908.

This companion volume to the "British Isles" by the same author, covers the remaining countries of Europe according to a similar plan, though of course necessarily much more briefly in order to keep within the bounds of a single volume. Much therefore has had to be omitted, for geographic factors have at all times played a foremost part in the history of European affairs. Complete discussion of the entire subject would require the labors of a lifetime. Hence the present volume must be regarded largely as a primer or general introduction, rather than a complete treatise.

The introductory chapters, repeated from Vol. I, might perhaps have been better omitted since the apparent intention is, and probable practice would be, to use the two volumes in conjunction. The space so saved could have been very profitably employed in other ways. Aside from this criticism, however, the book must be commended for general school use, wherever the object is to tie history down to its proper physical background. Even though its use is not adopted, teachers as a rule will profit by reading it carefully.

Heilprin, Angelo. *The Eruption of Pelée.* Pp. 72, with 43 full-page illustrations. Published for the Geographical Society of Philadelphia, by J. B. Lippincott Company, 1908.

This posthumous volume was already in type at the time of Professor Heilprin's death and now appears unchanged from the form in which he had prepared it. In this third volume dealing with the phenomena of Pelée, to the study of which Professor Heilprin devoted the last years of his life, he has brought together practically all his important data concerning that volcano. It includes most of the valuable data from his earlier publications, "Mont Pelée and the Tragedy of Martinique" and the "Tower of Pelée." Besides the results of these early investigations the present volume includes the results of his last visit to Martinique in the winter of 1906, when he explored the crater of Pelée and was able to investigate, at close quarters, the character of the tower or obelisk, from the fragments then remaining. The most important result of this investigation was the conclusion that the giant obelisk was the ancient core of the volcano—a character which is very strongly suggested in one of the illustrations accompanying the present volume.

This monograph is divided into six parts—the geography of Pelée; the obelisk of Pelée; the after history and nature of the obelisk; the phenomena of the eruptions; the nature of the destroying blast; and a concluding chapter on the question of volcanic and seismic inter-relationships. The first five chapters comprise a general survey of results from four years of studying the phenomena of Pelée much of which has already been made more or less familiar in the earlier publications already mentioned. The most important points in these chapters are those dealing with the obelisk or tower, and mainly the contention that it was in the nature of an ancient volcanic neck-core which under enormous pressure had been forced up from its moorings. It must be admitted that the arguments supporting this view are generally well taken.

The concluding chapter may perhaps be regarded as crystallizing Professsor Heilprin's views concerning volcanic activity, at least from the disputed side of inter-relationship. In this chapter he declares himself unqualifiedly in favor of the Naumann-Humboldt theory of volcanic and seismic relationship as against the modern view of general independence of these two classes of phenomena. To support this conclusion he cites the apparent synchronism of the four great earthquakes of recent date and volcanic activity: Southern Italy (1905) with activity of Vesuvius and Stromboli; San Francisco (with the upthrow of Bogoslov Island No. 3); Valparaiso (Chile) with the outbreak of Chillán; and Kingston (Jamaica) with eruptions of Central America volcanoes.

A large part of the volume is devoted to a very valuable and instructive series of full-page photographs illustrating all phases of the history of Pelée and its great eruption, making one of the most complete sets of views illustrating volcanic phenomena ever gathered in a single volume. Many of the pictures are truly striking and for themselves alone are well worth the whole cost of the volume.

The entire book stands as a fitting monument to the memory of the author, whose characteristic clear and forceful style has nowhere found better expression than in this, his last work.

WALTER S. TOWER.

RECENT ACCESSIONS TO THE LIBRARY OF THE SOCIETY

ALASKA—WATER SUPPLY.........................HENSHAW AND COVERT

Water Supply Investigations in Alaska 1906–1907. By Fred F. Henshaw and C. C. Covert. (U. S. Geol. Surv., Water Supply Paper No. 218.) Washington: 1908.

ARKANSAS—COAL FIELD.............................COLLIER AND OTHERS

The Arkansas Coal Field. By Arthur J. Collier. With reports on the Paleontology by David White and G. H. Girty. (U. S. Geol. Surv. Bull. No. 226.) Washington: 1907.

CALIFORNIA—HYDROGRAPHY .... CLAPP

The Surface Water Supply of California, 1906. By W. B. Clapp. (U. S. Geol. Surv., Water Supply Paper No. 213.) Washington: 1907.

CALIFORNIA—OIL RESOURCES.......................................ARNOLD

Geology and Oil Resources of the Summerland District, Santa Barbara Co., Cal. By Ralph Arnold. (U. S. Geol. Surv. Bull. No. 321.) Washington: 1907.

CALIFORNIA—OIL RESOURCES.........................ARNOLD AND ANDERSON

Geology and Oil Resources of the Santa Maria Oil District, Santa Barbara Co., Cal. By Ralph Arnold and Robert Anderson. (U. S. Geol. Surv. Bull. No. 322.) Washington: 1907.

CALIFORNIA—OIL RESOURCES.........................ELDRIDGE AND ARNOLD

The Santa Clara Valley, Puemte Hills and Los Angeles Oil Districts, S. Cal. By G. H. Eldridge and Ralph Arnold. (U. S. Geol. Surv. Bull. No. 309.) Washington: 1907.

NEBRASKA—HYDROGRAPHY .... CONDRA

Geology and Water Resources of a portion of the Missouri River Valley in N. E. Nebraska. By G. E. Condra. (U. S. Geol. Surv., Water Supply Paper No. 215.) Washington: 1908.

Geology and Water Resources of the Republican River Valley and adjacent Areas, Nebraska. By G. E. Condra. (U. S. Geol. Surv., Water Supply Paper No. 216.) Washington: 1907.

NORTH PACIFIC COAST—HYDROGRAPHY.................STEVENS AND OTHERS

Surface Water Supply of the N. Pacific Coast Drainage, 1906. By J. C. Stevens and others. (U. S. Geol. Surv., Water Supply Paper No. 214.) Washington: 1907.

UNITED STATES—ALASKA...............................PAIGE AND KNOPF

Geologic Reconaissance in the Matanuska and Talkeetna Basins, Alaska. By Sidney Paige and Adolph Knopf. (U. S. Geol. Surv. Bull. No. 327.) Washington: 1907.

UNITED STATES—CALIFORNIA........................GANNETT AND BALDWIN

Results of Spirit Levelling in California 1896 to 1907 inclusive. By S. S. Gannett and D. H. Baldwin. (U. S. Geol. Surv. Bull No. 342.) Washington: 1908.

UNITED STATES—COLORADO..............................MEEKER AND REED

Surface Water Supply of Colorado River Drainage above Yuma, 1906. By R. I. Meeker and H. S. Reed. (U. S. Geol. Surv., Water Supply Paper No. 211.) Washington: 1908.

UNITED STATES—GEOLOGY.

Twenty-eighth Annual Report of the Director of the United States Geological Survey to the Secretary of the Interior for the fiscal year ending June 30, 1907. Washington: 1907.

UNITED STATES—GREAT BASIN..........................LA RUE AND OTHERS

Surface Water Supply of the Great Basin Drainage, 1906. By E. C. La Rue and others. (U. S. Geol. Surv., Water Supply Paper No. 212.) Washington: 1908.

UNITED STATES—HYDROGRAPHY....................HORTON AND FOLLANSBEE

Surface Water Supply of Upper Mississippi River and Hudson Bay Drainage, 1906. By A. H. Horton and Robert Follansbee. (U. S. Geol. Surv., Water Supply Paper No. 207.) Washington: 1907.

UNITED STATES—HYDROGRAPHY..........................MEEKER AND GILES

Surface Water Supply of Lower Western Mississippi River Drainage, 1906. By R. I. Meeker and J. M. Giles. (U. S. Geol. Surv., Water Supply Paper No. 209.) Washington: 1907.

UNITED STATES—HYDROGRAPHY..........................TAYLOR AND LAMB

Surface Water Supply of W. Gulf of Mexico and Rio Grande Drainages, 1906. By T. W. Taylor and W. A. Lamb. (U. S. Geol. Surv., Water Supply Paper No. 210.) Washington: 1907.

UNITED STATES—MINERALS.

Mineral Resources of the United States, 1906. Washington: U. S. Geol. Surv., 1907.

UNITED STATES—WYOMING..VEATCH

Geography and Geology of a Portion of S. W. Wyoming with special reference to Coal and Oil. By A. C. Veatch. (U. S. Geol. Surv. Prof. Paper No. 56.) Washington: 1907.

UTAH—HYDROGRAPHY. .... LEE

Water Resources of Beaver Valley, Utah. By Willis T. Lee. (U. S. Geol. Surv., Water Supply Paper No. 217.) Washington: 1908.

EUROPE.

FRANCE .... COYLE

Fenceless France. By Robert M. Coyle. Philadelphia: Geo. H. Buchanan Co., 1908. Illustrations. *Presented by the Author.*

GREAT BRITAIN .... DANN

Historical Geography on a Regional Basis. Vol. 1—The British Isles. Vol. 2—Europe. By Ernest W. Dann. London: J. M. Dent & Co., 1908. Maps. *Presented by the Publishers.*

SPAIN AND PORTUGAL..BAEDEKER

Spain and Portugal. By Karl Baedeker. Leipzig: Karl Baedeker, 1908. Maps and Plans. *Presented by the Publisher. To be revised.*

OCEANICA AND POLAR REGIONS.

POLAR REGIONS .... LECOINTE

International Polar Commission. Session of 1908. Proceedings of the meetings. By G. Lecointe. *Presented by the International Polar Commission.*

GEOGRAPHY.

GEOGRAPHY—PHYSICAL .... DAVIS

Practical Exercises in Physical Geography. By William Morris Davis. Boston, Ginn & Co., 1908. With Accompanying Atlas. *Presented by the Publishers.*

GENERAL.

COAL MINE ACCIDENTS...............................HALL AND SNELLING

Coal Mine Accidents. Their Causes and Prevention. By Clarence Hall and Walter O. Snelling. With an introduction by Jos. A. Holmes. (U. S. Geol. Surv. Bull. No. 333.) Washington: 1908.

FUELS .... BRECKENRIDGE

A Study of Four Hundred Steaming Tests made at the Fuel Testing Plant, St. Louis, Mo. in 1904, 1905 and 1906. By Lester P. Breckenridge. (U. S. Geol. Surv. Bull. 325.) Washington: 1907.

FUELS .... HOLMES

Report of the U. S. Fuel Testing Plant at St. Louis, Mo., Jan. 1, 1906, to June 30, 1907. Joseph A. Holmes, in charge. (U. S. Geol. Surv. Bull, No. 332.) Washington: 1908.

FUELS .... RANDALL

The Burning of Coal without Smoke in Boiler Plants. By D. T. Randall. (U. S. Geol. Surv. Bull. No. 334.) Washington: 1908.

FUELS .... RANDALL

The Purchase of Coal under Government and Commercial Specifications on the Basis of its Heating Value. By D. T. Randall. (U. S. Geol. Surv. Bull. No. 339.) Washington: 1908.

FUELS .... VARIOUS AUTHORS

Washing and Coking Tests of Coal and Cupola Tests of Coke conducted by the U. S. Fuel-Testing Plant at St. Louis, Mo. (U. S. Geol. Surv. Bull. No. 336.) Washington: 1908.

GEOCHEMISTRY .... CLARKE

The Data of Geochemistry. By Frank Wigglesworth Clarke. (U. S. Geol. Surv. Bull. No. 330.) Washington: 1908.

GEOLOGY .... CAMPBELL

Contributions to Economic Geology, 1906. Pt. 2—Coal, Lignite, and Peat. By Marius L. Campbell. (U. S. Geol. Surv. Bull. No. 316.) Washington: 1907.

GEOLOGY .... CLARKE

Early Devonian History of New York and Eastern North America.

By John M. Clarke. (N. Y. State Museum Memoir No. 9.) Albany: 1908.

GEOLOGY .... FULLER

Summary of the Controlling Factors of Artesian Flows. By Myron L. Fuller. (U. S. Geol. Surv. Bull. No. 319.) Washington, 1908.

PALEONTOLOGY .... HATCHER

The Ceratopsia. By John B. Hatcher. (U. S. Geol. Surv. Monograph, No. 49.) Washington: 1907.

STRUCTURAL MATERALS .... HUMPHREY

Organization, Equipment and Operation of the Structural Materials. Testing Laboratories at St. Louis, Mo. By Richard L. Humphrey and others. (U. S. Geol. Surv. Bull. No. 329.) Washington: 1908.

STRUCTURAL MATERIALS............................HUMPHREY AND JORDAN

Portland Cement Mortars and their Constituent Materials. Results of Tests made at Testing Laboratories, Forest Park, St. Louis, Mo., 1905–07. By Richard L. Humphrey and William Jordan, Jr. (U. S. Geol. Surv. Bull. No. 331.) Washington: 1908.

MAPS.

Pilot Charts of the N. Atlantic Ocean for June, July, August and September., 1908.

Pilot Charts of the N. Pacific Ocean for July and August, 1908.

Map of the Yukon Territory. Issued by the Geological Survey of Canada. 1905.

Special Map of Rossland, British Columbia. Issued by the Department of Mines of the Geological Survey of Canada. 1908.

Map of Ontario—Lake Nipigon Sheet. Issued by the Department of the Interior. Ontario: 1907.

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